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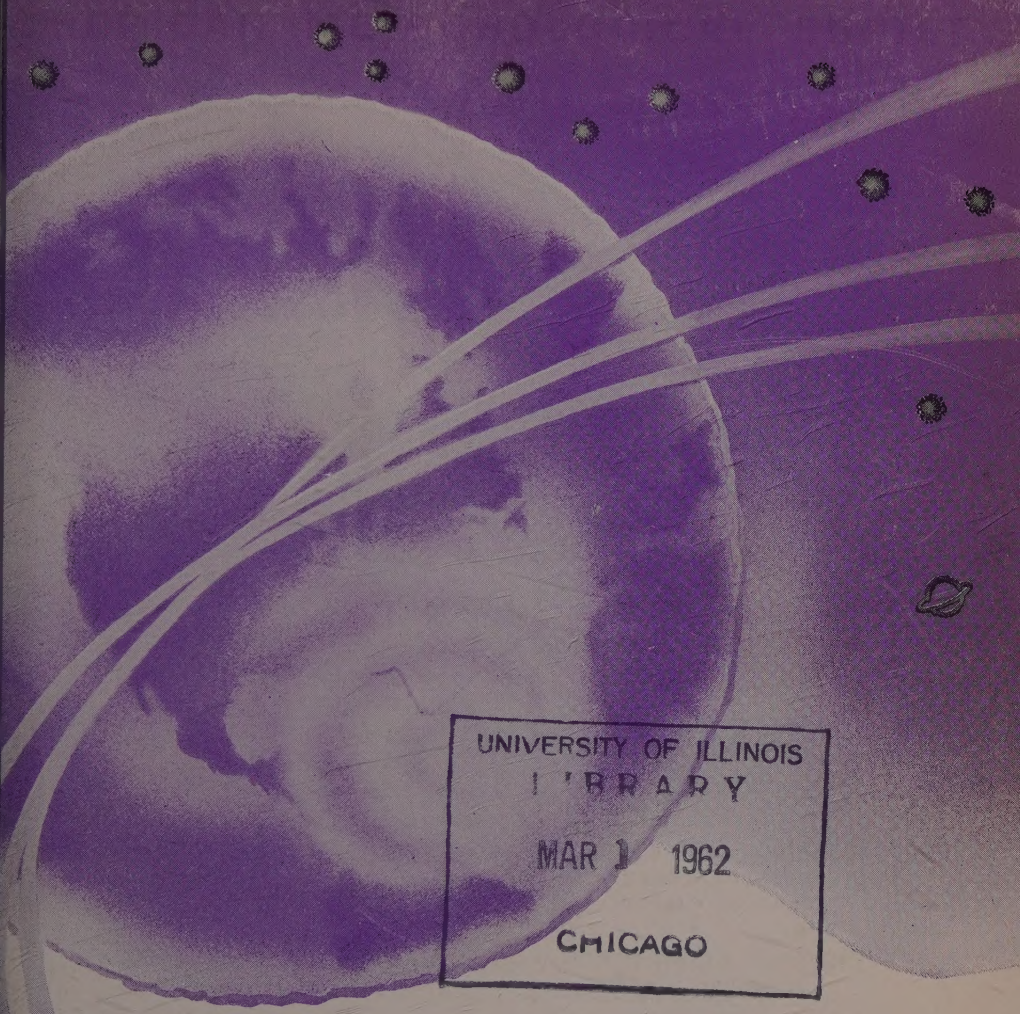

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Vol. 12 OCTOBER 1961 NO. 10

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

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METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS

MALCOLM RIGBY, Editor

Vol. 12 October 1961 No. 10

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AMERICAN
METEOROLOGICAL
SOCIETY
1919

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2. Mercury, Venus, and Mars

By

Andrew Meglis and Geza Thuronyi

(For complete table of contents see back cover)

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FOREWORD

Meteorological and Geoastrophysical Abstracts is a monthly publication devoted to current literature in meteorology, geophysics and astrophysics.

Part I contains abstracts of current literature in the fields of meteorology, etc.

Part II of each issue comprises an annotated bibliography of important references on a special subject. Bibliographies published in the successive issues were:

Vol. I, 1950

Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm
Condensation Trails	10. Clim. of N. E. Africa	11. Mountain Met.	Detect.

Vol. III, 1952

Clim. of N. W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc.
High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V. 1954

Oceanog. Met.	2. Clim. of S. E. Asia	3. Auroral Physics	4. Tropopause
Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.		3. Storm Surges
Ionospheric Prop.	5. Photochem.—Upper Atmos.		6. Cloud Physics
Radar Cloud Physics	8–9. Atmos. Nuclei	10. Weather Modification	11. Cooling Power

Vol. VII, 1956

Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
Snow Micromet.	8. Snow Micromet. (Suppl.)	9–11. Tropical Cyclones

Vol. VIII, 1957

Solar Weather Relations	2. Night Airglow	3. Forecasting Special Elements	
Forest Micrometeorology	5. Hydromet. Forecasting	6. Numerical Forecast. (Suppl.)	
Albedo	8. Meteors	9–10. Tropospheric Prop.	11. Medical Meteorology

Vol. IX, 1958

Radioastronomy	2. Solar Astrophysics	3. Radioactivity in Atmosphere
Waves and Currents	5. Physical Oceanog.	6. Dynamic & Phys. Oceanog.
Long Range Forecast.	8. Radar Met. 9. Cosmic Rays	10–11. Geomagnetism

Vol. X, 1959

1. Works of C. E. P. Brooks	2. Tornado Forecasting	3. Soil Moisture	4. Sferics
-6. Ozone	7. Acoustic Waves	8. Evaporation Measurement	
9. Evapotranspiration (–1955)	10. Evapotranspiration (1956–1959)		11. Evaporation

Vol. XI, 1960

1. Outstanding Reference Works	2. Outstanding Texts	3. Numerical Forecast. (Suppl.)
4. Ionospheric Physics	5. Ionospheric Propagation	6. Ionosphere
7. Forecast Verification	8. Radar Meteorology	9. Rocket Meteorology
0. Satellite Meteorology	11. Airglow	

Bibliographies in preparation or published in Vol. XII

. *Aurora*	4–6. *Upper Atmos. Structure*	9. *Planetary Atmospheres: General*
. *Auroral Physics*	7. *Precipitation Chemistry*	10. *Planet. Atmos.: Mars, Venus & Saturn*
. *Limnology*	8. *Upper Atmos. Humidity*	11. *Jovian Planets and Moon*

Part III contains a listing of translations and the contents of important publications. hese are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where material may be found. The Union List of Serials (Gregory) is the source of most of symbols used. In some cases, where no symbol has been assigned to a library, one will devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md
DNLM:	U. S. National Library of Medicine, Washington, D. C.
DP:	U. S. Patent Office Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by cha

Geographic locations are in the English form rather than the form used locally, for exam Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless other stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet using a modi tion of the Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Nu (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thu entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau*, *Jahrgang* 2 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

ART I. ABSTRACTS OF CURRENT METEOROLOGICAL AND GEOASTROPHYSICAL MATERIAL

A. GENERAL

A1. COLLECTED WORKS

12.10–1 551.557:551.510.535:551.594.13

Akademiia Nauk SSSR. Mezhduvedomstvennyĭ Komitet po Provedeniiu MGG, **rifts and irregularities in the ionosphere.** Ed. by S. F. Mirkotan; A. D. Podol'skiĭ and V. V. ruzgul'. Transl. of original Russian: **Dreify i neodnorodnosti v ionosfere,** issued as its *ornik Stateĭ V Razdel Programmy MBB* (*Ionosfera*), No. 1, **1959.** 69 p. figs., tables, fs., eqs. **DLC.** Transl. issued as *U. S. National Aeronautics and Space Administration, chnical Translation* F-20, June **1960.** 100 p. figs., bibliogs., eqs. Contents: **Preface,** 1–2. Gusev, V. D. et al., **Results of the study of parameters of large-scale ionospheric regularities by the phase method,** p. 4–26. Kushnerevskiĭ, Iu. V. and Zayarnaia, E. S., **rift of small-scale irregularities in the F-2 layer,** p. 27–44. Erofeev, N. M.; Dzhemilev, G.; Perelygin, V. P. and Petinov, V. P., **Original results of radiotechnical observations of e movement of irregularities in the ionosphere (winds) over Ashkahabad at altitudes of 0–300 km.,** p. 45–54. Kashcheev, V. L.; Tsymbal, N. T. and Proshkin, Ie. G., **Study of the nosphere above Khar'kov during the IGY period,** p. 54–69. Checha, V. A. and Zelenkov, E., **Drifts of irregularities in the ionosphere according to observations of the Tomsk Iono-heric Station,** p. 70–83. Kokurin, Iu. L., **Shape and movement of small irregularities in e ionosphere,** p. 84-100. These articles abstracted separately.—The present collection of rticles presents the principal results of observations conducted at the Ashkhabad, Moscow Moscow State University and Izmiran), Tomsk and Kharkov stations. Sufficiently extensive d systematic data dealing with the study of ionospheric irregularities have been obtained ainly during the 1957–1958 period. This monograph also includes an article devoted to the udy of ionospheric irregularities, conducted by means of radioastronomic methods at the meiz station, which was performed at a somewhat earlier date. *Subject Headings:* **1. Iono-heric anomalies 2. Ionospheric drift 3. IGY ionosphere program.**—*NASA abstract.* Ⓢ

12.10–2 551.506.22 550.3:551.5:061.3(437)

*†Československá Akademie Věd, Prague, **International Geophysical Year and cooperation Czechoslovakia, 1957–1959.** Prague, **1960.** 269 p. figs., tables, refs. throughout. Con-nts (all articles abstracted separately): Novák, Josef, **Introduction,** p. 13–35. Mrázek, Jiří, **orld days and warnings,** p. 37–47. Kostka, Oldřich, **Meteorology,** p. 49–77. Bouska, Jan, **eomagnetism,** p. 79–93. Link, Frantisek, **Aurorae and airglow,** p. 95–111. Mrázek, Jiří, **nosphere,** p. 113–125. Guth, Vladimír, **Meteors,** p. 127–144. Švestka, Zdeněk, **Solar tivity,** p. 145–167. Petržílka, Václav, **Cosmic rays,** p. 169–183. Buchar, Emil, **Longitudes d latitudes,** p. 185–203. Guth, Vladimír, **Rockets and satellites,** p. 207–218. Kárník, Vít, **eismology,** p. 219–238. Pícha, Jan, **Gravimetry,** p. 239–252. Podzimek, Josef, **Nuclear diation,** p. 253–265. **DWB** (551.06 I613cz)—The purpose of this publication is to give formation about the Czechoslovakian network of stations and about the number of workers gaged in the program, as well as to report on the work, on the observational methods and on me results obtained. The papers included here were presented at the science conference, onsored by the Czechoslovak Academy of Sciences, and held at Liblice in March, 1960. hese represent in part this country's participation in IGY and IGC. *Subject Headings:* **Czechoslovak participation in IGY 2. Czechoslovak participation in IGC 3. Geophysical ports.**—*E.Z.S.* Ⓢ

12.10–3 551.510.536:061.3:629.19(0

International Space Science Symposium, Nice, Jan. 1960, **Space research: Proceedin of the First Symposium, Nice, Jan. 11–16, 1960.** Ed. by Hilde Kallmann Bijl. Amsterda North-Holland Pub. Co., **1960.** 1195 p. figs., photos, tables, refs., eqs. "Sponsored COSPAR (Committee on Space Research, of International Council of Scientific Unions Articles in English, French and Russian. Most with summaries in English and Russia (For listing of articles, *see* Pt. III, p. 631, March 1961, *Met. Abs.* These articles abstract separately.) **DWB** (523.1 I61sp). Also: Muller, P., **Le congrès de l'espace à Nice.** [Spa congress at Nice.] *L'Astronomie*, Paris, 74(4):171–177, April **1960** and 74(5):213–218, M **1960. DLC, NNC, DWB.** Also: Boyd, R. L. F., **Space science.** *Nature*, London, 186(472 :749–751, June 4, **1960.** table. **DWB**—This book contains the complete set of papers p sented before the first International Space Symposium. The Symposium was attended scientists from 18 nations. The subjects discussed were limited to scientific research, mos of a nonbiological nature. The papers read before the symposium concentrated, instead on future plans, on the results already achieved since the first Sputnik was launched Oct. 4, 1957. Also included were many detailed data obtained by Explorer VI and the R sian moon probes launched in the second half of 1959. About one hundred papers were re These are arranged under the following chapter headings: the Earth's atmosphere, the io sphere, tracking and telemetering, solar radiation, cosmic radiation, interplanetary dust, a the Moon and the Planets. Abstracts are given for each paper. *Subject Headings:* **1. Ast nautical symposia 2. COSPAR Symposium, Nice, 1960 3. Nice, France.**—*I.S.* ⑤

12.10–4 628.1(

*U. S. Congress. Senate. Select Committee on National Resources, **Water resour activities in the United States.** *86th Congress, First Session, Committee Prints*, No. 1–4, 6– 12–13, 16, 19 and 20, Aug. **1959**–Jan. **1960.** Wash., D. C., U. S. Govt. Print. Office, 1959–19 Each Print separately paged. figs., photos, tables. **DWB** (M79 U582wa)—Also No. 21– 30 Feb. 1960–March 1960. Issued **1960.** A collection of reports making an exhaustive stu of various aspects connected with the water resources activities in the United States. Am this mass of information three reports—Committee Print Nos. 21, 22 & 23—are of spe interest to the meteorologist. They deal, in order, with the subjects of evapotranspirat reduction, weather modification and evaporation reduction and seepage control. The rep are extensively illustrated. *Subject Headings:* **1. Water resources 2. United States.**—*I.S.*

12.10–5 551.574.1:061.3(08) 551.577:061.3(08) 551.594.21:061.3(

Mezhvedomstvennaia Konferentsiia po Voprosam Issledovaniia Oblakov, Osadko Grozovogo Elektrichestva, 5th, Leningrad, 1956, **Issledovanie oblakov, osadkov i grozov elektrichestva.** [Investigations on clouds, precipitation and thunderstorm electricit Leningrad, Gidrometeoizdat, **1957.** 214 p. figs., tables, refs. At head of t-p.: Glav Upravlenie Gidrometeorologicheskoĭ Sluzhby pri Sovete Ministrov SSSR. (For listing of c tents, *see* 10(8):1275, Aug. 1959, *Met. Abs.* All articles abstracted separately.) D (QC921.M41956c)—The Fifth Inter-Departmental Conference on problems of cloud inve gation, precipitation and thunderstorm electricity was held in the Main Geophysical Obse tory from Feb. 6–11, 1956. Problems of macro- and microphysics of clouds, cloud and forecasts, precipitation, thunderstorm electricity, and artificial modification of clouds v discussed in 59 reports. The reports were presented under five main headings correspond to the five sessions: 1) plenary session, 2) section on aerological and synoptic investigati 3) section on microphysics of clouds, 4) section on thunderstorm electricity and 5) sectio methods of research and measurement. *Subject Headings:* **1. Cloud physics confere 2. Thunderstorm electricity symposia 3. Cloud modification research 4. Leningrad, U.S.** —*S.N.*

12.10–6 621(08) 532.5(08) 533.6

†Prandtl, Ludwig, **Gesammelte Abhandlungen zur angewandten Mechanik, Hydro- Aerodynamik.** [Collected works on applied mechanics, hydro- and aerodynamics] Ed Walter Tollmien; Herman Schlichting; Henry Görtler and F. W. Riegels. Berlin, Sprin

Verlag, 1961. 3 Vol. (1620 p.) port., 1003 figs., refs., eqs. Table of contents of all three volumes given in front of each vol. Biographical sketch Vol. 1:iv–x. Additional biographical data, Vol. 3:1618–1620. Chronological list of his publications, Vol. 1:1–9. Index of additional publications, Vol. 3:1609–1611. Index of dissertations defended before Prandtl, Vol. 3:1612–1617. **DWB**—Three volumes of Prandtl's works on mechanics, hydrodynamics and aerodynamics. The first volume deals with elasticity, plasticity and rheology, as well as airplane wings and propellers. The second volume deals with boundary layers and resistance, turbulence and vorticity, as well as gas dynamics. The third volume deals with meteorological applications and techniques of model experiments and a variety of miscellaneous subjects. A bibliography of the author's publications, as well as other publications which are not cited in the text, are included. The text is supplemented with numerous photographs, sketches, tables and graphs. *Subject Headings:* **1. Applied mechanics 2. Hydrodynamics 3. Aerodynamics 4. Collected works of Ludwig Prandtl 5. Prandtl, Ludwig.**—*E.Z.S.*

A2. TEXTBOOKS

12.10–7 551.5(02) 551.501.1

Skliarov, Viktor Mironovich, **Meteorologiia i meteorologicheskie nabliudeniia: obshchedostupnyĭ kurs.** [Meteorology and meteorological observations; general course.] Leningrad, Gidrometeoizdat, **1960.** 368 p. 129 figs., 15 tables, 13 refs., eqs. **DWB** (M(07) S626me)—A new and revised edition of **Meteorology for hydrometeorological observers,** pub. **1955** (*see* 3.9–6, Sept. 1957, *Met. Abs.*) It is intended to facilitate the work of observers of meteorological stations and to improve their professional knowledge. The book explains the organization of meteorological observations, the radiative energy of the atmosphere, temperature of soil and air, humidity and vapor condensation, clouds, precipitation, snow, atmospheric pressure, wind, electric and optic phenomena in the atmosphere, meteorological visibility and weather forecasts. *Subject Headings:* **1. Meteorology textbooks 2. Observation techniques.**—*S.N.*

12.10–8 551.579(02)

*†Chebotarev, A. I., **Obshchaia gidrologiia: vody sushi.** [General hydrology: continental waters.] Leningrad, Gidrometeoizdat, **1960.** 539 p. 156 figs., 58 tables, bibliog. p. 533–538, eqs. **DWB** (M79 C514ob)—The book is intended to facilitate the preparation of specialists in hydrology. It contains analyses of basic hydrologic phenomena, meteorological conditions and their effect on continental waters, ground water, rivers, lakes, swamps, glaciers and studies of U.S.S.R. continental waters and hydrology. *Subject Heading:* **1. Hydrology textbooks.**—*S.N.*

12.10–9 551.1(02) 550.36(02)

*†Gutenberg, Beno (*Seismological Lab., Calif. Inst. Tech., Pasadena, Calif.*), **Physics of the Earth's interior.** New York, Academic Press, **1959.** 240 p. numerous figs., tables, bibliog. p. 21–226, +bibliog. after each chapter, numerous eqs. (*International Geophysics Series,* Vol. 1, edited by J. Van Mieghem) **DLC** (QE509.G8)—A geophysical monograph on the physics of the earth's interior. The results of recent investigations pertinent to the understanding of the physics of the earth's interior are brought together and evaluated. Seismological investigations are discussed only in so far as they bear upon the structure of the earth and the physics of its interior. The nature of discontinuities is considered; a variety of interpretations bearing on phase changes, change of state and compositional changes are discussed. References to recent investigations follow each chapter. The nine chapters of the monograph present discussions and data on: 1) fundamental problems and fundamental data; 2) the structure of the earth; 3) the earth's crust; 4) the mantle of the earth; 5) the core; 6) temperature and thermal processes in the earth; 7) density, pressure, gravity, and flattening in the earth; 8) elastic constants, and elastic processes in the earth; 9) nonelastic processes in the earth. Discussions related to gravity, terrestrial magnetism, tectonic processes, and the history of the earth are limited to such problems which, if solved, may give information on the earth's interior. Tables, charts, graphs and schematic diagrams supplement the text. *Subject Headings:* **1. Geophysics textbooks 2. Earth's interior 3. Physics of earth's interior.**—*E.Z.S.*

12.10–10 523.51(02

*†Krinov, E. L., **Principles of meteoritics.** Transl. from the Russian by Irene Vidziunas Transl. edited by Harrison Brown. N. Y., Pergamon Press, **1960.** 535 p. 154 figs., 5 plates 51 tables, 270 refs. **DWB** (523.51 K59pr)—This book contains a comprehensive and systemati presentation of the principles of meteoritics. The introductory chapter explains meteoritic and its scope and reviews, old and recent views on the origin of meteorites. Following a dis cussion on the motion and fall of meteorites, separate chapters treat the morphology, chemistry petrography, mineralogy, and physical properties of meteorites. The origin and nature o tektites and silica-glass are treated separately. A catalog of meteorites of the U.S.S.R. i included. The concluding chapter summarizes hypotheses on the origin of meteorites. It i pointed out that the totality of the available factual data makes possible a deduction tha meteorites represent fragments of several, perhaps many, celestial bodies of the dimensions c asteroids. However, the problem of the origin of meteors is still unsolved. This work give the view of meteoritics primarily from a Russian perspective and is based largely on collection made within the U.S.S.R. since 1749. *Subject Headings:* **1. Meteoritics textbooks 2. Mete orites 3. Tektites. I. Vidziunas, Irene** (*transl.*).—*E.Z.S.*

12.10–11 551.521.18(08

*†Hackforth, Henry L. (*Research Staff, Nortonics, Northrop Corp.*), **Infrared radiation** N. Y., McGraw-Hill, **1960.** 303 p. numerous figs., tables, refs. at end of chap., eqs. **DW** (M21.3 H121in)—A textbook planned for use in junior college and university courses. In th first eight chapters of Pt. I the reader is introduced to the fundamental principles of infrare radiation, to the components, materials, limitations, and problems encountered and to th scope and future possibilities of infrared systems. Ch. I describes the nature of infrared radia tion and presents a brief history of its development. Ch. 2 defines the basic physical law and develops a model of a generalized infrared system which traces the path of an infrare signal from its source to its final recording or display. Chs. 3 through 7 discuss in detail th "building blocks" used in the model. Ch. 8 discusses the fundamental principles of infrare system design. Pt. II illustrates how these concepts are applied in practice, with Chs 8 throug 12 devoted to infrared instruments and their uses, and to applications of infrared in the science in industry, and in space technology and its applied sciences. In discussing atmospher transmission of infrared radiation the dependence upon meteorological conditions is point out. The influences of water vapor, carbon dioxide, ozone, and primary atmospheric co stituents are indicated. Data and concepts are presented graphically. In addition to refe ences following each chapter, the appendix contains a list of books on infrared radiation an related subjects. *Subject Heading:* **1. Infrared radiation textbooks.**—*E.Z.S.*

12.10–12 58(255)(0

†Chapman, V. J. (*Auckland Univ., New Zealand*), **Salt marshes and salt deserts of t world.** London, Leonard Hill Books, Ltd.; N. Y., Interscience Publishers, Inc., **1960.** 392 101 figs., 45 plates, 52 tables, bibliog. p. 353–371. (*Plant Science Monographs*, ed. by Nichol Polunin) **DWB** (M86:58 C466sa)—This text gives a general description of salt marshes a salt deserts of the world but greatest detail is given about British salt marshes. Three chapte are devoted to discussions of the physiography of, and tidal influences on, the salt marshes. T physiology of halophytes is treated separately and because these marshes represent valua potential agricultural land, a chapter is devoted to a discussion of their utilization. The s marshes of the following areas are described: Arctic and Continental European, Mediterrane and Australia, Eurasia and the New World. An introductory discussion explains the distin tion between salt marshes and salt deserts. The text is illustrated by photographs, sketch charts and maps. It is a textbook for specialists in botany, coastal studies and geograph *Subject Headings:* **1. Botany textbooks 2. Salt marshes 3. Salt deserts.**—*E.Z.S.*

12.10–13 551(02)(2

†Klenova, M. V., **Geologiia Barentsova moria.** [Geology of the Barents Sea.] Mosc Akademiia Nauk SSSR, **1960.** 366 p. 147 figs., 68 tables, 336 refs. At head of t Akademiia Nauk SSSR. Komissiia po Problemam Severa pri Prezidiume AN SSSR. D (GC451. K55)—A sizeable book on the geology of the Barents Sea on basis of computed d

on the composition and structure of its bottom, concerns its submarine relief, its physiogeographical particularities, investigations of sediments, distribution of sediments with respect to relief, mineral and chemical compound and stratification of sediments. The text is amplified by a great number of charts, tables, cross-sections, graphs, maps, etc. *Subject Headings:* **1. Geology textbooks 2. Geology of the Barents Sea 3. Barents Sea.**—*S.N.*

12.10–14 550.4:551.501.1(02)

Smales, A. A. and Wager, L. R. (*eds.*), **Methods in geochemistry.** New York: Interscience Publishers, **1960.** 464 p. illus. Price: $13.50; 94s. **DLC** (QE515.S55). Review by H. B. Milner in *Nature*, London, 188(4753, Supp.):823, Dec. 3, **1960.**—A textbook of methods used in geochemistry. An explanation of the methods of collection and preparation of material for analysis and an analysis of gravimetric and volumetric methods, flame photometry, colormetry and related techniques is given. There are separate chapters dealing with spectrochemical analysis, fluorescent x-ray spectrography, stable isotope geochemistry, and mass spectrometric analysis, mass spectrometric isotope dilution analysis, radiochemical methods, radioactivation analysis, polarography, and some modern chemical separation methods. Students in the later stages of geological, geochemical, and analytical chemistry courses will be able to get an overall picture of the many new analytical methods which are rapidly increasing the amounts of fundamental information about the composition of the earth as a whole and of its major parts. Chemists working in the borderline field of geochemistry will find the more geological parts of the book of value and geologists wishing to know how analytical data are obtained, or planning to obtain them themselves, will find it of value in estimating the significance of data or in selecting methods. *Subject Heading:* **1. Geochemistry textbooks 2. Geochemical methods.**—*E.Z.S.*

12.10–15 526(02)

Stepanova, N. N., **Geodeziia.** [Geodesy.] Leningrad, Gidrometeoizdat, **1954.** 343 p. 218 figs., 39 tables, 137 eqs. **DLC** (QB301.S8). Review by Kh. M. Tsopikov in *Meteorologiia i Gidrologiia*, Leningrad, No. 1:61–62, **1958.**—A textbook on surveying, intended for students of hydrometeorological institutes. It can also be used as a practical handbook by technicians doing survey work. Its 18 chapters cover: 1) introduction; 2) plan and map; 3) general notion of errors and of methods for evaluating measurement accuracy; 4) parts of survey angle gages; 5) theodolites and field measurement of angles; 6) line orientation; 7) linear measurements on terrain, 8) securing basic points of geodetic surveys; 9) theodolite surveying; 10) replotting, measuring area; 11) theory of geometric leveling; 12) carrying out of technical leveling; 13) third class (hydrological) leveling, river leveling and measurements; 14) tachymetric surveying; 15) plane tabling; 16) transit surveys and barometric leveling; 17) fundamentals of photogrammetry; 18) cartographic projections. Ch. 16 (p. 287–301) contains ample information on methods of barometric hypsometry and instruments (aneroid barometers) used for measuring heights. *Subject Heading:* **1. Geodesy textbooks.**—*A.M.P.*

A3. MONOGRAPHS

12.10–16 551.578.46(99)

†Kopanev, I. D., **Snezhnyĭ pokrov Antarktidy.** [Snow cover of Antarctica.] Gidrometeorologicheskoe Izdatel'stvo, Leningrad, **1960.** 142 p. 31 figs., 78 tables, 64 refs., eqs. At head of t.-p.: Glavnaia Geofizicheskaia Observatoriia.—This monograph is a review of available knowledge on the snow cover of Antarctica and of the scientific data obtained by the Second Soviet Continental Expedition (in Antarctica) in 1956–1958. The contents include the following: meteorological conditions for formation of snow cover, namely precipitation, atmospheric temperature and wind; methods of observation on the height and density of the snow cover; distribution, density and firmness of snow cover and forms of deposition of snow; dynamics of the snow cover including wind turbulent friction, number of days with snow storms, duration of snow storms and quantitative estimation of transported snow; various quantitative features of the radiation balance of the snow surface such as total radiation, absorbed radiation, effective radiation and radiation balance; heat regime of the snow cover, turbulent heat exchange in the atmospheric layer near the ground, heat exchange in the snow

cover and heat expenditure for evaporation. Extensive data are presented in tables and synoptic maps and illustrations of cloud cover, installations, etc. are given. *Subject Headings:* **1. Snow cover in Antarctica 2. Soviet Antarctic Expedition, 1956–1958 3. Antarctica.**—*I.L.D.*

12.10–17 551.521.1(479.22)

*†Meliia, G. T., **Gelioĕnergeticheskie resursy Gruzinskoĭ SSR.** [Solar energy resources of the Georgian S.S.R.] Tiflis, Akademiia Nauk Gruzinskoĭ SSR, **1959.** 126 p. 64 figs., 31 tables, 48 refs., eqs. At head of t-p.: Akademiia Nauk Gruzinskoĭ SSR. Sovet po Izucheniiu Proizvoditel'nykh Sil. **DLC** (QC911.M47)—The radiative energy of the sun and the amount of solar energy covering some areas of the Georgian S.S.R. are investigated in connection with a project of an experimental industrial helio power station of the Acad. of Sci. of the U.S.S.R. near Mount Ararat. Devices for recording direct and scattered solar radiation, for transforming radiative energy into heat, shapes of mirrors used, direct transformation of solar energy into electric power and estimates of the obtained results are described. *Subject Headings:* **1. Solar energy measurement techniques 2. Solar energy research in Georgian S.S.R. 3. Georgian S.S.R.**—*S.N.*

12.10–18 551.582:016(5)

*†Vitvitskiĭ, G. N., **Klimaty zarubezhnoĭ Azii.** [Climates of non-Soviet Asia.] Moscow, Gosud. Izd-vo Geograficheskoĭ Litry, **1960.** 396 p. figs., charts, maps, 19 tables, 325 refs. **DWB** (M82.1/5 V854kL)—The present monograph is a scientific compendium in which the climates of non-Soviet Asia are considered in detail. The author gives the general picture of climate formation and then characterizes the separate regions. The whole monograph is based on the author's study of numerous domestic and foreign works on the subject. Three main chapters are: 1) Formation of climates; 2) Climatic regions; 3) Tables of climatic characteristics. Four seasons of the year are discussed in the first chapter. The second chapter contains the description of climates in temperate zone, subtropical zone, tropical zones of Northern and Southern Hemispheres and equatorial zone. In each zone the regions are discussed separately. Nineteen tables with climate characteristics are carried in the third chapter. Alphabetic list of stations is given in appendix. *Subject Headings:* **1. Climatology of non-Soviet Asia 2. Climatology bibliographies 3. Asia.**—*B.J.G.*

12.10–19 551.510.528:551.51

§Danielsen, Edwin F. (*Univ. of Wash., Seattle*), **The laminar structure of the atmosphere and its relation to the concept of a tropopause.** Thesis (Ph.D)—University of Washington, **1958.** 106 p. 47 figs., 2 tables, 24 refs., 22 eqs. **DWB** (M10.536 D186La). Also issued in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 11(3):293–332, 1959. 29 figs., 2 tables, 13 refs., 15 eqs. English, German & French summaries p. 293–295. **DWB DLC**—The study is based on the premise that the tropopause (or tropopauses) is not a discontinuity surface but boundaries of "laminars" which are quasi-horizontal, shallow vertically and bounded by steep lapse rates coinciding with isentropic surface extending from the troposphere into the stratosphere with no limit on flow of air from stratospheric to tropospheric or vice-versa, or to transfer of heat moisture or substance. The tropopause is defined as a baroclinic surface above which average baroclimatic is negative and stability large, and below which the opposites prevail. After an historical review in Ch. I, the author described the data, charts, methods of analyzing data and of determining errors in stream function, winds, etc. in Ch. II. In Ch. III he takes up the existence and spatial continuity of a stable laminar, with examples, in Ch. IV stratospheric-tropospheric mass interchange and time-continuity of laminars, using surface charts, 290°K isentropic charts, etc. Ch. V discusses the macro- and mesoscale thermal structure of the atmosphere from smoothed detailed soundings. Ch. VI gives a summary, conclusions and suggestions for future research cross sections (1000–100 mb) across the central and eastern part of the continent show detailed thermal structure with zones of concentration of isotherms which correspond to the "laminars." Many isentropic charts and trajectories are also included in illustrations. The thesis has been revised and condensed in the published version. *Subject Headings:* **1. Tropopause structure 2. Laminars in atmosphere.**—*M.R.*

12.10–20 551.510.72:662.2:539.1:575

*India. Defence Science Organization, **Nuclear explosions and their effects.** Foreword by Jawaharlal Nehru. Delhi, Publications Div., Ministry of Information and Broadcasting, Govt. of India, **1958.** 275+59 p. 4 charts (fold.), map, tables. **DWB** (623.451.19 I39nu), **DLC** (UF767.I45 1958)—This book describes in broad terms the physical and biological effects of nuclear explosions on man. Special attention is given to the radiological effects of high-yield fission explosions which liberate energy equivalent to millions of tons of TNT. The introductory chapter presents a background to the main subject. It gives a description of effects of the bombing of Hiroshima and Nagasaki as well as test explosions. The second chapter is mainly concerned with the broad scientific principles underlying fission and fusion explosions. The Bikini test of March 1954 is described. The third chapter deals with the energy released in fission and then considers the radioactivity of fission products. Ch. 4 reports in considerable detail on the effects of atomic bombs, considering the air burst, the heat burst, the heat flash, the shock wave and the radiological effects. The following chapters describe the somatic effects on man, that is, the radiation-caused damage which manifests itself in the irradiated individuals, and the genetic effect which manifests itself not in the exposed individuals but in their descendents. The effects of nuclear explosions on weather are also considered. Considerable pertinent data and technical information are presented in the appendixes. *Subject Headings:* **1. Atomic explosion effects 2. Nuclear explosion effects on genetics. I. Kothari, D. S. (ed.).**—*E.Z.S.*

12.10–21 551.482:551.579.4

†Rzhanitsyn, N. A., **Morfologicheskie i gidrologicheskie zakonomernosti stroeniia rechnoi seti.** [Morphological and hydrological characteristics of river systems.] Leningrad, Gidrometeoizdat., **1960.** 237 p. 98 figs., 33 tables, 128 refs., 82 eqs. **DWB** (M79 R999mo)—The study of river systems was undertaken for improving the navigability of inland waterways. It concerns the establishment of characteristics of river flow for finding the rules governing seasonal changes in relation to length of flow, and the establishment of local morphometric properties for solving particular problems of river hydrology. *Subject Headings:* **1. Morphology of rivers 2. River hydrology.**—*S.N.*

12.10–22 551.555.3:63

*†Tsuberbiller, Elena Aleksandrovna, **Agroklimaticheskaia kharakteristika sukhoveev.** [Agroclimatic characteristics of sukhovei winds.] Leningrad, Gidrometeoizdat, **1959.** 117 p. 22 tables, 65 refs. **DWB** (M:63 T882ag)—The monograph describes the results of a scientific study of the nature of sukhovei (dry) winds and the damage caused by them. It includes a discussion of meteorological conditions engendering them, the frequency of their occurrence in various regions of the U.S.S.R., and an evaluation of the effectiveness of shelter-belts planting, irrigation and snow retention as a means of reducing their disastrous effect on agricultural crops. *Subject Headings:* **1. Sukhovei effects on agriculture 2. Sukhovei damage reduction techniques.**—*A.M.P.*

12.10–23 551.584:551.588:63

Van Wijk, W. R., **Klimaat en mikroklimaat.** [Climate and microclimate.] Wageningen, H. Veenman & Zonen, **1960.** 18 p. **DWB** (M8 W662kL)—In this general survey of applied microclimatology, the author discusses the following; the origin and development of the concept climate; purpose of climatic classification including the classification of KÖPPEN, THORNTHWAITE, etc.; the comfort climate diagram for man, measurement of climatic comfort during rest and work and the use of the concept "strain" by D. H. K. LEE to assess climatic stress; heat balance, water balance and irrigation (the Lake Hefner studies, effect of irrigation upon climate as indicated by irrigation in Turkmen, U.S.S.R., etc.); the concept of microclimate and its definition; variation of microclimate at the surface of the earth and the factors determining this variation; the relationships of microclimate to plant diseases and modification of microclimate. *Subject Headings:* **1. Heat balance 2. Plant microclimatology 3. Microclimatic influences on agriculture 4. Microclimatological variations.**—*I.L.D.*

12.10–24 526.73 531.51

†Wollard, G. P. and Rose, J. C., **Final report on gravity program.** Woods Hole Oceanographic Institution, Mass., Contract AF 19(604)-2157, Final Report, July **1960.** Parts separately paged. figs., tables, refs., eqs. **DWB**—This report covers a program of pendulum and gravimeter measurements conducted during 1950–59. The objective of the program was to establish a series of reliable gravity control measurements through the use of pendulums over a sufficient range of gravity to permit the calibration of geodetic gravimeters with an accuracy of one part in 5000 over a range of 5000 mgals and thus assure a potential accuracy of 1 mgal or better with such gravimeters on a global series of measurements. The objective was modified to include the establishment of pendulum gravity measurements outside of North America as there appeared to be no unanimity of international opinion regarding a gravity standard. The second objective was to expand the gravity coverage and standardize existing gravity surveys within the U. S. so that reliable gravity anomaly maps could be prepared. The third objective was to strengthen and expand the world network of airport gravity bases established earlier under the auspices of the Office of Naval Research so that data in all parts of the world could be integrated onto the same datum and gravity standard. This report is divided on the basis of these objectives into three parts with an introductory chapter giving the history of the program and a final chapter giving recommendations for further desirable work. The cooperative program with other groups of observers—Cambridge University in Africa, South America, Pacific area, Institute of Geophysics, University of Mexico and the California Exploration Company is explained. The overall reliability of the results as evaluated through comparisons with data obtained by other observational groups at the same sites show that the pendulum measurements on the whole have an average reliability of ±0.4 mgal, and that the gravimeter values have a comparable absolute accuracy on a world wide basis and a relative reliability on a more restricted basis of ±0.2 to ±0.3 mgal. It is pointed out that the results of the program indicate that the original objectives of the study were obtained. *Subject Headings:* **1. Pendulum measurements 2. Gravimeter measurements 3. Gravity measurements.**—*E.Z.S.*

12.10–25 551.526.6:551.509.323

*†Laevastu, T., **Factors affecting the temperature of the surface layer of the sea.** *Finska Vetenskaps-Societeten, Helsinki, Commentationes Physico-Mathematicae,* 25(1), **1960.** 136 p. 28 figs., 30 tables, bibliog. p. 128–134, 60 eqs. **DLC**—The principles and methods for forecasting temperature and its changes in the surface layers of the sea are analyzed and summarized in this paper. The discussion is organized into three parts. In the first part heat exchange between the sea and the atmosphere is studied. The second part deals with factors determining temperature changes and structure in the sea. Temperature hindcasts and forecasts and sources of error are discussed in the third part. New approaches and improvements to the earlier forecasting procedures are proposed. The construction of empirical formulas, based on the consideration of physical cause-effect principles, which can be used with ease for practical predictions is emphasized. The study is extensively illustrated by tables and graphical presentations. *Subject Headings:* **1. Heat exchange sea-atmosphere 2. Forecasting temperature variations in sea layers 3. Forecasting techniques.**—*I.S.*

A4. MANUALS AND ATLASES

See also: **Preparation of weather charts and maps** (U. S. A. W. S.), 12.10–240; **Weather use of asynoptic data** (U. S. A. W. S.), 12.10–242.

12.10–26 551.46(265/266)

*†**Oceanic observations of the Pacific, 1955, the NORPAC Data.** Berkeley, University of California Press; Tokyo, University of Tokyo Press, **1960.** 532 p. 16 charts, 66 refs. Almost entirely tables. Also: **Oceanic observations of the Pacific, 1955, the NORPAC Atlas.** Berkeley, Univ. of California Press; Tokyo, Univ. of Tokyo Press, **1960.** 9 p. 123 charts (fold.). 54×39 cm. "Atlas of temperature, salinity, oxygen phosphate, density, current measurements, and geopotential anomaly and data of such of the biological materials as could be prepared for the entire area." Also: **Oceanic observations of the Pacific, 1950.** Berkeley, Univ. of California Press, **1960.** 507 p. 19 charts, 48 refs. Almost entirely tables. Price

$4.50. **DLC.** (For abstract on 1949 data, *see* 9.2–81, Feb. 1958, *Met. Abs.*) **DLC**—The volume on **data** "contains data from only a group of expeditions made in 1955, known as the NORPAC Expeditions. Other data collected during that year will be published in the regular 1955 volume of the series. The data tabulated in this volume have been used to prepare maps and sections of the various properties in the upper thousand meters of the ocean in the area covered by these expeditions, pub. in the **NORPAC Atlas.**" The **Atlas** contains charts of horizontal and vertical distributions of certain of the physical properties measured by the NORPAC Cruises. In addition to biological data, it also includes charts of atmospheric pressure, surface temperature, and surface currents. The NORPAC expeditions included 1002 hydrographic stations surveyed by nineteen vessels representing fourteen institutions. They covered the Pacific Ocean north of 20 degrees north latitude. Most of the work was done in July, August, and Sept. of 1955. The data from the hydrographic stations have been used to prepare maps of temperature, salinity, dissolved oxygen, inorganic phosphate-phosphorus and thermosteric anomaly at depths of 10, 50, 100, 200, 400, 600, and 1000 meters. The geopotential anomaly of the 0, −200, and 400—decibar surfaces relative to the 1000—decibar surface has been computed and mapped. The upper thousand meters of the fields of temperature, salinity, dissolved oxygen and inorganic phosphate-phosphorus, and the thermosteric anomaly are portrayed also on vertical sections along four parallels and five meridians. The maps and sections include representations of specific volume anomaly rather than of density. The field contoured is that of the pressure-independent part of the specific volume anomaly since this more nearly approximates the potential volume anomaly. Base maps, plotting sheets, common place names and charts are included. Tables of values of Sigma-T corresponding to the values of thermosteric anomaly used on the maps and sections and a table explaining the nets and methods of hauling for the zooplankton and fish larvae for which data are included. *Subject Headings:* **1. Oceanographic data for Pacific Ocean 2. NORPAC Expeditions, 1955 3. Pacific Ocean. I. Reid, Joseph L., Jr.** (*ed.*) **II. Tokyo. University.**—*E.Z.S.*

12.10–27 551.509.317:551.547:551.524.72:551.524.32(02)

*Pagava, S. T.; Zakharova, N. M. and Sevalkina, N. A., **Atmosfernye makroprotsessy obuslovlivaiushchie zhachitel'nye mesiachnye anomalii temperatury vozdukha na Evropeĭskoĭ territorii SSSR.** [Atmospheric macro-processes causing significant monthly anomalies of temperature over European U.S.S.R.] Moscow, Gidrometeoizdat, **1960.** 111 p. 37 figs., 19 tables. **DWB**—A standard pamphlet type of guide or handbook for use in studying and in forecasting extreme temperature anomalies over European U.S.S.R. during the next two or three months in advance from mean 5-day thermobaric charts (500 mb). The system is based on anomalous tropospheric circulation patterns or types which are specified in detail after having been shown (statistically or empirically) to precede significant positive or negative temp. anomalies in various parts of Eastern Europe. Detailed charts and tables illustrate the processes and results as determined from past records and charts. Five-day temp. anomalies during the first and second month following the event, monthly anomalies during the third month, possibility of rhythms in the atmosphere and examples of actual 3-month forecast preparation are given. *Subject Headings:* **1. Long range forecast anomalies in European U.S.S.R. 2. Three-monthly temperature forecast on anomalies 3. Monthly temperature anomalies 4. Temperature forecasting manuals 5. U.S.S.R.**—*M.R.*

12.10–28 551.509.329:551.326.83(02)

*†Shuliakovskiĭ, L. G., **Poiavlenie l'da i nachalo ledostava na rekakh, ozerakh i vodokhranilishchakh; raschety dlia tseleĭ prognozov.** [Beginning of ice formation and freezing of rivers, lakes and reservoirs; tabulations for prognostic purposes.] Moscow, Gidrometeoizdat, **1960.** 216 p. 23 figs., 29 tables, bibliog. p. 209–216, 128 eqs. **DWB** (511.311 S562po)—With the construction of hydraulic power plants, the ice formation of rivers is essentially changed. Studies for developing methods for forecasting the first ice formation and the beginning of freezing of rivers, shallow lakes and reservoirs are outlined. The results were reported on at the Third All Union Hydrological Conference, 1957, and at the All Union Conference of Forecasts of Inland Waterways in 1959. *Subject Headings:* **1. Ice formation on rivers 2. River ice forecasting manuals 3. Soviet hydrology 5. U.S.S.R.**—*S.N.*

12.10–29 551.501.4:551.507.362.2(02)

Zhonogolovich, I. D. and Amelin, V. M., **Collection of tables and nomograms for the processing of observations made on artificial earth satellites.** Transl. from the Russian by Prasenjit Basu. N. Y., Pergamon Press, **1961.** 188 p. At head of t-p.; Issued by the Institute of Theoretical Astronomy, Academy of Sciences of the U.S.S.R. On recto half-title page, Mathematical Tables, Vol. 12. On verso, Preface to the Russian edition. **DLC** (TL796.6.E2Z513), **DWB** (629.1308 Z63co). Transl. of original Russian **Sbornik tablits i nomogramm dlia obrabotki nabliudenii iskusstvennykh sputnikov Zemli.** Moscow, ANSSSR, **1960.** 182 p. Mostly tables. **DLC** (TL796.6.E2Z5)—The present collection is designed to facilitate work connected with the compilation of ephemerides and with the processing of observations made on artificial earth satellites. It is composed of tables and nomograms which permit the calculation of the local topocentric coordinates of a satellite in accordance with the elements of its movement by an observer situated at any point on the Earth's surface. The tables have been worked out for a wide range of values of the elements of possible artificial earth satellites. By way of explanation a description is given of the formation and of the rules for using tables and nomograms, and many examples are given. The collection is intended for specialist astronomers and for amateur astronomers engaged on the observation of artificial earth satellites and on the processing of the results obtained from their observations. *Subject Headings:* **1. Satellite data processing 2. Satellite observation techniques 3. Astronomy manuals. I. Basu, Prasenjit** (*transl.*).—*Authors' abstract.*

12.10–30 551.509.1(02)

Great Britain. Hydrographic Office, **Admiralty list of radio signals, Vol. 3, 1956, Meteorological services and codes.** London, **1956.** 244 p. figs. (fold.) Also **Vol. 3, 1957.** issued **1957.** 255 p. **DWB** (MO9.1 G786ad)—A voluminous manual listing all types of information needed for collection, dissemination by radio and use of weather reports and forecasts at sea. Various types of messages (synoptic analysis, forecast and climat) are described, local broadcasts from British stations, International Meteorological Codes (1955), radio stations throughout the world and their call numbers, radio schedules from Ocean weather ships, radio weather messages, conversion tables, etc. are given *in extenso*, with ample maps and charts for local as well as world-wide coverage where needed. *Subject Headings:* **1. Marine meteorological services 2. Marine meteorology 3. Meteorological codes 4. Meteorology manuals.**—*M.R.*

A5. POPULAR SCIENCE BOOKS

See also: **Meteors, shooting stars, fire balls** (Marchal), 12.10–162.

12.10–31 551.510(023)

Beliakov, Mikhail Vasil'evich, **Atmosfera.** [Atmosphere.] Moscow, Gos. Izd-vo Fiziko-matematicheskoĭ Lit-ry, **1960.** 2nd ed. 70 p. 23 figs., table, foot-refs., foot-notes. **DLC** (QC863.B37)—A popular monograph explaining what the atmosphere is, the temperature of the air, water in the air, air currents, four strata of the atmosphere and its boundary. In the new edition a chapter is added entitled **A new step in investigating the atmosphere** which briefly reports the contributions to the knowledge of the upper atmosphere by Soviet rockets. *Subject Headings:* **1. Atmospheric structure 2. Atmospheric temperature 3. Rocket investigation of upper atmosphere.**—*S.N.*

12.10–32 551.515.4

Kolobkov, N. V. and Mezentsev, V. A., **Groznye iavleniia atmosfery.** [Thunderstorm phenomena in the atmosphere.] Moscow, Gos. Izd-vo Geogr. Lit-ry, **1951.** 149 p. 44 figs. foot-refs. At head of t.-p.: Iavleniia prirody. **DLC** (QC968.K59)—Various thunderstorm phenomena, showers, hail, squalls and tornadoes and their origin are described, as well as strong winds, desert winds and the wind effect on soil and sowing. *Subject Heading:* **1. Thunderstorms.**—*S.N.*

12.10–33 551.515 551.593/4

Mezentsev, Vladimir Andreevich, **Neobyknovennye iavleniia v atmosfere.** [Unusual phenomena in the atmosphere.] Moscow, Profizdat, **1959.** 91 p. 17 figs. **DLC** (QC883.M45)—General description and illustrations of various atmospheric phenomena related to atmospheric pressure, wind force, refraction of light, electric and lightning phenomena and falling meteorites. Each observed unusual phenomenon is explained with actually related causes: destructive winds and tornadoes by atmospheric disturbances; flying heavy objects and rainbrain by tornadoes; colored (red, blue, green) snow by flying colored dust and microbes; optical phenomena (rainbows, mirages, halos, etc.) by light refraction in water and ice particles suspended in air, and lightning and fire balls by electric phenomena, etc. *Subject Headings:* **1. Unusual atmospheric phenomena 2. Optical phenomena 3. Electrical phenomena 4. Atmospheric disturbances.**—*N.P.S.*

12.10–34 92:551.46(09)

Daugherty, Charles Michael, **Searchers of the sea : pioneers in oceanography.** Illustrated by Don Miller. New York, Viking Press, **1961.** 160 p. **DLC** (GC57.D3)—A narrative of the history of oceanography, in popular style, centered around biographical sketches of more than twenty men who, from ancient times to the present, contributed to the advancement of the science of oceanography. Those whose contributions receive most attention are Henry the Navigator, Columbus, Da Gamma, Magellan, John Davis, William Dampier, Joseph Banks, James Cook, Benjamin Franklin, Mathew Fontaine Muary, Edward Forbes, Alexander von Humbolt, Charles Robert Darwin, Wyville Thomson, Alexander Agassiz, Fridtjof Nansen, Otto Sverdrup, Columbus O'Donnell Iselin, Harald Ulrik Sverdrup and Auguste Piccard. *Subject Headings:* **1. History of oceanography 2. Biographies of oceanographers.**—*E.Z.S.*

A6. ARCTIC—ANTARCTIC

Arctic

See also: **Geology of Barents Sea** (Klenova), 12.10–13; **Nansen the explorer** (Shackleton), 12.10–66.

12.10–35 551.506.3:551.582.2(71) 551.506.7(71)

*Canada. Meteorological Branch, **Climatological summaries for the Joint Arctic Weather Stations at Alert, Eureka, Isachsen, Mould Bay and Resolute, N.W.T., 1954, 1955, 1956, 1957 and 1958.** All issued **1960.** Each 75 p. Almost entirely tables. "First of a series of annual volumes covering the years, 1954–1958, inclusive. 1959 will be published in semi-annual publications." **DWB**—Consists of a Foreword and Preface, which include notes on the location of the stations, and the instrumentation and method of observation; and tables, arranged in three sections, one giving daily values of climatological elements, a second giving detailed information on the eight synoptic observations per day, and the third giving monthly means of upper air data. *Subject Headings:* **1. Climatic summaries 2. Synoptic data 3. Canadian Arctic.**—*Author's abstract.*

12.10–36 551.326.62(268)

Crary, Albert P. (*A. F. Camb. Res Center*), **Build up of thick floating ice in Arctic areas.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes*, No. 29, Dec. **1959.** p. 39–42, fig. **DWB**—Present meteorological and oceanographic conditions would not allow 60 m ice shelves to form. Carbon dating and also marine shells found 38 m above sea level suggest that the land has risen in the last 7200 years at an average ratio of 0.5 m per century, and glaciers were inactive. It seems unlikely that the base of ice bodies (Ellesmere ice shelf) consist of glacier ice. The base consists of ice grown by freezing from the bottom. Methods are suggested for additional and more effective means of investigating this subject. *Subject Headings:* **1. Ice shelves 2. Ice drift theories 3. Arctic Ocean.**—*E.Z.S.*

12.10–37 551.501.9:551.326.62(9

Sychev, K. A., **Tri goda dreĭfa plavuchego ledianogo ostrova "Severnyĭ polius-6."** [Thr years of drift of the floating ice island "North Pole-6."] *Morskoĭ Flot*, Moscow, 19(4):21–2 April **1959.** 3 figs., 2 tables. **DLC**—Ice island North Pole-6 is 9 by 13 km in area and is ov shaped. Its average height above sea level is 85 cm. Its drift is stable and proceeds from t Arctic Ocean to the Greenland Sea. The drift is resultant of the current motions and t prevailing winds. Data on the drift characteristics of stations and vessels in the Arctic bas and on the drift of ice island North Pole-6, maps showing the general drift of vessels and dr stations in the Arctic Ocean and a diagram of the drift of this station in 1956–1957 and 195 1958 are presented. The drift of this ice island resembles that of pack ice. It was found react rapidly to the wind regime and the current system. During 1956–1957 the resulti drift was directed opposite to the resultant wind which was northeasterly, the ice island drift to the shouthwest entirely under the influence of the ocean currents. The station was d continued in 1960. From the area of drift of this station it is concluded that the so call "Sanikov Land" and other legendary areas reported in the Arctic Ocean were nothing more th ice islands. *Subject Headings:* **1. Ice drift stations 2. Soviet drifting station, 1956–19 3. Arctic.**—*I.L.D.*

12.10–38 91.04(98) 551.506.5:551.582.1(9

Makkaveev, Pavel Alekseevich, **Ostrov uedineniia.** [Uyedineniye Island.] Mosc Gosud. Izdat-vo Geograficheskoĭ Lit-y, **1957.** 103 p. photos, figs. **DLC** (G839.U9M2) Personal impressions of Arctic conditions and tip on the ice breaker "Malygin" to Uyedinen ("Solitude") (77°30′N, 82°11′E) a small island located in the northeastern part of the Kara S is described in detail with maps and illustrations. The description also includes an account the landing of instruments and supplies and construction of various sheds and buildings for t laboratory, radio station and living quarters under severe Arctic conditions. The meteo logical observations are outlined only briefly. The return trip was made partly on the i breaker "Murman" to Dickson Island and partly on the steamship "Vritzkiy" to Murman *Subject Headings:* **1. Arctic expeditions 2. Uyedineniye Island, Kara Sea 3. Arctic.**—*N.P.*

Antarctic

See also: **Snow cover, Antarctica** (Kopanev), 12.10–16; **Antarctic symposium, Buenos Aires** (Weill), 12.10–58; **IGY glaciolog. works, Wilkes station** (Hollin, Cameron), 12.10–224; **Glacier problems, South Georgia** (Smith), 12.10–226; **Ice budget for Antarctica** (Wexler), 12.10–228; **Synoptic conditions of Indian sector of Antarctica** (Tauber), 12.10–329; **Movement of Ross Ice Shelf** (MacDonald, Hatherton), 12.10–231.

12.10–39 551.555.4:551.588.2(9

Dolganov, L. V., **Antarkticheskiĭ sklon i skorost' stokovogo vetra.** [The Antarctic sl and the speed of the katabatic wind.] *Problemy Arktiki i Antarktiki*, Leningrad, No. 3:41– **1960.** 3 figs., 2 tables, 7 refs., 27 eqs. **DWB**—Attempt is made to establish the relat between the land relief and the katabatic wind in various parts of the Antarctic coastal zo Specific conditions are described during which the katabatic wind is sliding down along mountain slopes under the impact of overcooled air. This wind is characterized by h velocity and steadiness in direction. The coastal temperature conditions and other weat factors are related to these winds. An exponential relation of katabatic wind and relief w analyzed for the region of Mirny and Oazis. The analysis is made on the basis of the obser data on topography of this territory and on the analytical and graphical relations of the sl length and its angularity with wind velocity. Similar analysis and computation were also m for various parts of Adélieland, Mawson and Lazarev stations. *Subject Headings:* **1. Katab winds 2. Topographic effects on winds 3. Antarctica.**—*N.P.S.*

12.10–40 551.506.7(99) 551.509.3(

§*Gaĭgerov, S. S., **Nekotorye dannye aerologicheskogo issledovaniia atmosfery Antarkti** [Certain data of aerological investigations of the atmosphere in the Antarctic.] *Mosc*

Tsentral'naia Aerologicheskaia Observatoriia, Trudy, No. 27, **1959.** 85 p. 30 figs., 11 tables, 13 refs. **DLC**—A monograph presenting a preliminary analysis of aerological data obtained on the Soviet Continental Antarctic Expedition Feb. 1957–Jan. 1958. History, methods of airplane observations, of winds and temperatures, general character of circulation in the Eastern Antarctic, orographic cyclones originating on the continent, vertical structure of cyclones, tropospheric jet streams, thermal regime of troposphere, variations in tropopause, height and temperature, temperature variation in lower stratosphere, stratospheric jet streams, glacial winds and temperature peculiarities in the lower layer of the atmosphere. The data are presented in extensive tables of frequencies, means, cross sections, sounding diagrams, etc. Observational material consisted of 29 radiosonde observations at Pioneerskaia (2700 m) from Dec. 7, 1956 to Jan. 13, 1957; 186 at Vostok I (3290 m) from June 18–Nov. 19, 1957; 11 at Vostok (magnetic pole at 3500 m) from Dec. 26, 1957–Jan. 5, 1958; 38 at Komsomolskaia (3540 m) Nov. 28, 1957–Jan. 9, 1958; 319 at Oazis, March 28, 1957 to Jan. 5, 1958 and 1455—4 times daily temperature-wind soundings at Mirny (Feb. 1, 1957 to Jan. 31, 1958). Soundings reached a height of 36 km in Oct. 1956 and Jan. 1958 at Mirny. Synoptic charts showing examples of cyclonic development are included. *Subject Headings:* **1. Antarctic aerological data 2. Antarctic radiosonde observations 3. Antarctic synoptic studies 4. Soviet (East) Antarctic. I. Khrgian, A. Kh.** (*ed.*).—*M.R*

12.10–41 551.521:551.524(99)

Rusin, N. P., **Nekotorye kharakteristiki radiatsionnogo i teplovogo balansa v Vostochnoĭ Antarktide.** [Some characteristics of radiation and heat balance in eastern Antarctica.] *Sovetskaia Antarkticheskaia Ekspeditsiia, 1955*, [*Materialy*], Vol. 2, issued Leningrad, **1959.** p. 39–45. fig., 6 tables, foot-ref. **DWB** (M82/99 K81pe). **DLC**—One basic factor affecting the formation of the meteorological conditions at the layer near the ground and of the Antarctic climate is the negative annual balance of radiation. The characteristics of the components of this balance are given for the warm and cold periods of the year. These characteristics are discussed in the text for both meteorological stations at Mirny and Pioneerskaia for various months and years—1932–33 and 1936–38. The daily and monthly data on the components of the radiation balance are tabulated for two Antarctic and one Arctic stations for comparison, including the months of June, Aug., Dec. and Feb. The radiation component data include the daily and monthly values for total radiation; dispersed radiation; direct radiation on horizontal surface; reflected radiation; radiation balance and albedo. Moreover, daily components of heat balance on the snow-ice surfaces and rock surface are illustrated by a set of curves for the radiation balance, turbulent heat flow, heat for evaporation, and heat exchanged with the ground (rocks). Hourly variations of the turbulence coefficient are tabulated for Aug., Oct. and Jan., and annual average comparison of various characteristics and general discussion of the data are given in the text. *Subject Headings:* **1. Albedo measurements 2. Heat balance measurements 3. Radiation measurements 4. Mirny, Antarctica 5. Pioneerskaia, Antarctica.**—*N.P.S.*

12.10–42 551.501.9(99) 551.582.2(99)

Rusin, N. P., **Meteorologicheskiia kharakteristika raiona observatorii Mirnyi.** [Meteorological characteristics of the Mirny Observatory region.] *Sovetskaia Antarkticheskaia Ekspeditsiia, 1955*, [*Materialy*], Vol. 2, issued Leningrad, **1959.** p. 55–67. 3 figs., 13 tables. **DWB** (M82/99 K81pe)—Meteorological observations at Mirny, after preliminary processing and analyzing, were used for the description of general conditions along the Pravda shore. In this article the author considers meteorological characteristics during 1956, peculiarities of conditions, and also general regularities in the physical processes, especially in the layer near the ground and along the eastern shore of the Antarctic. The discussion of various meteorological characteristics (temperature, humidity, wind velocity, cold air stream, drifting snow storm, cloudiness, precipitation, fog, and other physical phenomena), is given with tabulated average data and with analysis of specific cases for maximum and minimum values, and also unusual irregularities in climatic conditions. In conclusion, the general meteorological conditions in the Mirny region are briefly outlined, in which also is included the temperature limits, humidity variation, wind and snow storm season, cloudiness, fog, etc. *Subject Headings:* **1. Meteorological observations 2. Mirny, Antarctica.**—*N.P.S.*

12.10–43 551.506.5:551.506.7(99)

Shchekin, A. E., **Aerologicheskie nabliudennia Pervoĭ antarkicheskoĭ ekspeditsii.** [Aerological observations of the First Antarctic Expedition.] *U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. Komitet po Provedeniiu MGG, Informatsionnyĭ Sbornik*, No. 4:32–43, 1957. 2 figs., 5 tables. **DWB**—The purpose of the aerological observations was to accumulate data for establishing the temperature and wind regime aloft above the coasts of Eastern Antarctica and to serve the aviation of the expedition. The special modifications of the meteorological equipment is described, and the aerological observations made on board the "Lena" during its trip to the coasts of Antarctica from Dec. 29, 1955 to Jan. 18, 1956, are summarized briefly with the aid of vertical temperature cross-section along the course of the "Lena" and numerical data on atmospheric temperatures in the test. At the Mirny observatory the aerological program included twice daily temperature-wind soundings, daily pibal observations on vertical motions in the atmosphere, every other day a series of frequent temperature-wind soundings at six hour intervals to investigate synoptic conditions and occasional soundings with airplanes, balloons, kites and air samples. The procedure of radiosonde observations at Mirny, which began Feb. 12, 1956, the care of the instruments, the properties of the latex balloons, the source of electric energy for the radiosonde transmitters, release of the radiosondes, the determination of the vertical velocity of radiosondes and pibals, etc., are described. Tables giving the total aerological observations carried out at Mirny during Feb. 12, 1956–Jan. 31, 1957, the number of cases of combined temperature-wind soundings at different altitudes during the year at 0600 and 1800 o'clock Meridian time, characteristics of the tropopause (monthly values of height, temperature, etc.) as observed at Mirny during 1956–1957, mean wind velocities at Mirny at different altitudes during Dec.–Feb. and June–Aug. and prevailing wind directions according to altitude at Mirny. The radiosonde and pibal observations along the traverse Mirny-Pioneerskaia allow the follow preliminary conclusions: an inversion above the ice exists on the continent, its upper limit above the ice surface drops from 850 m at the crest to 300 m in the interior above Pioneerskaia, but its intensity increases from $-1°$ to $-9°$/100 met. At 12–15 km the temperature is uniform. With elevation the wind rotates from the southeast at the ice surface to south-west-south at approximately 2 km and 3 km above sea level at Mirny and Pioneerskaia respectively. *Subject Headings:* **1. Antarctic aerological observations 2. IGY Antarctic program 3. Antarctica.**—*I.L.D.*

12.10–44 551.524.4:551.554(99)

Valtat, B. (*Météorologie Nationale, Paris*), **Note sur les modifications de structure thermiques des basses couches pour divers régimes de vent au sol à Dumont d'Urville.** [Note on the modifications of temperature profiles in the lower layers for different ground wind conditions at Dumont d'Urville.] *La Météorologie*, Paris, Ser. 4, No. 57:127–133, Jan./March **1960.** 5 figs., 2 refs. French, English, Spanish and Russian summaries p. 127. **DWB**—For two quite different ground wind conditions at Dumont d'Urville, the mean profiles of wind and temperature from ground to 4000 m have been determined. It has been noticed that in the lower layers (0–2000 m) there is a net difference of structure depending whether the station is within the domain of Katabatic wind or not. *Subject Headings:* **1. Temperature profiles 2. Wind profiles 3. Dumont d'Urville station, Antarctica.**—*Author's abstract.*

12.10–45 551.506.7:551.510.528/53(99

Kangos, James Demetrios, **An analysis of upper-air observations at McMurdo Sound Antarctica.** N. Y. Univ. College of Engineering. Research Div. Dept. of Meteorology and Oceanography, Contract AF 19(604)-1755, Scientific Report No. 7, July **1959.** 28 p. 12 figs. 19 refs., eq. **DWB**—The height of the tropopause is determined at McMurdo Sound for Jan. 1957 and July 1957 using three methods. The tropopause was found to be lower in summer than in winter. Mean temperature soundings for Jan. 1957, July 1957, and Oct. 1957 were determined to study the effect of the sun's rays on the heating of the Antarctic atmosphere. It was found that radiational heating of the atmosphere by the sun seemed to be predominant process. Mean vertical wind profiles for July 1957 at McMurdo Sound reveal that the wind increases to the top of the sounding, whereas during Jan. 1957 a wind maximum is present in the vicinity of the tropopause. *Subject Headings:* **1. Tropopause temperature variations 2. Tropopause height variations 3. Vertical wind profiles 4. McMurdo Sound, Antarctica** —*Author's abstract.*

A7. IGY—IUGG—WMO

See also: **IGY and Czechoslovak cooperation,** 12.10–2; **Obs. of vector of variations of horiz. component of geomag. field acc. to IGY obs.** (Kalashnikov, Zybin), 12.10–195; **Seasonal variation in sea level in Pacific during IGY** (Pattullo), 12.10–213; **IGY glaciol. works, Wilkes Station** (Hollin, Cameron), 12.10–224; **Glacier problems, South Georgia** (Smith), 12.10–226; **Ice budget for Antarc.** (Wexler), 12.10–228.

12.10–46 526:550.3:551.5:061.3

Reichelderfer, F. W., **On the role of IUGG in advancement of geophysics.** *American Geophysical Union, Transactions*, 41(1):1–3, March **1960. DWB, DLC**—An announcement of the Twelfth General Assembly of the IUGG to be held in Helsinki and some introductory remarks about the organization. The aim of the Union is to promote the study of the Earth, its oceans, and atmosphere throughout; to initiate, facilitate and coordinate geophysical research, to provide international meetings for discussion and publication of results of research; to promote coordination among all related scientific associations. The IUGG has also a working agreement with the WMO to promote coordination of programs and exchange of information. *Subject Heading:* **1. IUGG program.**—*I.S.*

12.10–47 526:550.3:551.5:061.3

Joyce, J. Wallace, **The International Union of Geodesy and Geophysics.** *American Geophysical Union, Transactions*, 41(1):22–25, March **1960. DWB, DLC**—A note providing a summary account of the IUGG, including its background, objectives, structure, and method of operation. The seven international associations of the IUGG and their functions are mentioned. The Union, in carrying out its functions, depends on a series of internal structures, beginning at the top with the General Assembly and progressing through the Council, Executive Committee, the Bureau, and special or standing committees. The programs of the Union and its associations, their publications and the scientific nature of the General Assemblies are also briefly described. *Subject Headings:* **1. International Union of Geodesy and Geophysics 2. IUGG program.**—*I.S.*

12.10–48 551.5:061.3

International Union of Geodesy and Geophysics. Association of Meteorology and Atmospheric Physics, **Statutes.** Toronto, **1957.** (12 p.) In French and English. **DWB**—Gives an account of the status and functioning of the International Association of Meteorology and Atmospheric Physics. The objects of this Association are to promote and facilitate the study and research of atmospheric physics. The Association consists of a bureau, the secretariat, the executive committee, the general assembly of delegates, the special scientific commissions, and the joint scientific committees. *Subject Headings:* **1. Meteorological societies 2. Atmospheric physics 3. International Association of Meteorology and Atmospheric Physics.**—*A.H.K.*

12.10–49 551.579 551.5:061.1

Tison, L. J., (*Sec. of the International Association for Scientific Hydrology*), **A propos d'une Organisation Hydrologique Mondiale.** [On the World Hydrological Organization.] *International Council of Scientific Unions, ICSU Review*, 1(4):184–187, Oct. **1959.**—After having described the reasons favoring the founding of a world hydrological organization, the author defines the aims of this organization and discusses this problem by its specialized offices. In this regard the role of the International Association for Scientific Hydrology is clearly defined. The practical solution propounded should consist in extending the WMO to become the World Meteorological and Hydrological Organization. *Subject Headings:* **1. World Hydrological Organization 2. World Meteorological Organization.**—*A.V.*

A8. SERVICES AND INSTITUTIONS

See also: **IGY and Czech. coop.,** 12.10–2; **Alibag magn. obs.** (Basu et al.), 12.10–192; **Cartuja Seism. Sta.** (Due Rojo), 12.10–200.

12.10–50 551.579:016(47)

†Lászlóffy, Woldemár and Szesztay, Károly, **A hidrológia a Szovjetúnióban.** [Hydrology in the Soviet Union.] Vízügyi Közlemények, Budapest, No. 3:360–397, **1960.** 24 figs., 40 refs.

Russian, French and German summaries in Abstract section. p. 53–55. **DWB, DLC**—Th organizational structure, the activity and regional distribution of institutions of the U.S.S.R. dealing with hydrology are described. The bulk of the hydrological methodological data an research work is managed by the General Directorate of the Hydrometeorological Servic Moscow, which is immediately subordinate to the Cabinet Council of the Soviet Union by director generals, 8 research establishments of central and regional character, respectivel The observations, measurements, and their first analyses are performed by about 7000 hydr meteorological branches and stations. The collaboration between the gigantic observati network and research is assured by elaborate instructions and manuals. The organizati and activity of the individual directorates are outlined and a description of the hydrometeor logical directorate of the Ukrainian S.S.R., Kiev, is given. The center of hydrometeorologic research is the 400 year old State Hydrological Institute, Leningrad. Its task is research connection with water supply; i.e. the formation of river beds, lakes, dams and swamps, a development of the observational network (development of instruments, measurement too and analytical methods). The hydrological experimental stations at different places in t country are important for research. One of the oldest and largest of them is the experimen station at Valdaĭ, affiliated with the State Hydrological Research Institute. Besides extend research on evaporation, the Institute deals with discharge and precipitation, with develo ment of instruments and methods of observation, the securing of regional hydrological bas and also with professional and prognostic education. The hydrological reporting and fo casting service is directed by a specific office of the Directorate General. The Central Institu of Forecasting has three hydrological sections for the research on the water flow of rivers, conditions, and on operational works (short and long term forecasts) intended for the high party and political authorities. The education of hydrological engineers is performed at t hydrometeorological colleges at Leningrad and Odessa, and at the departments of geography five states. *Subject Headings:* **1. Soviet hydrology 2. General Directorate of Hydrometeor logical Service, Moscow 3. Hydrologic research 4. U.S.S.R.**—*Transl. of German abstr (O.T.).*

12.10–51 551.5:061.1(569

Neumann, J., **Work of research of the Meteorological Dept. in the first ten years existence of the State of Israel.** (In: Israel. Meteorological Service, **Book of ten years of Meteorological Service of Israel.** Tel Aviv, **1958.** p. 14–15.) In Hebrew. **DWB** (M(I85se)—The Meteorological Service is primarily interested in practical research. The pres review summarizes varieties of research undertaken by the Service apart from its contributi made to basic research. This research work can be arranged in the following 8 groups: 1) wa administration, problems of rainfall and evaporation; 2) water cover needed for irrigation a function of meteorological factors; 3) agricultural problems; 4) shipment of citrus by sh 5) changes in sea-level outside of harbors; 6) measurement of atmospheric radiation, radiat from group and from sea surfaces; 7) internal temperature of buildings; 8) numerical forecasti *Subject Headings:* **1. Meteorological research 2. Israel.**—*I.S.*

12.10–52 551.58:061.6(

Mather, John R., **The Laboratory of Climatology—an institute for climatic resear** *Weather*, London, 15(5):168–172, May **1960. DWB**—A brief history and review of the rec research activities of the Laboratory of Climatology in Centerton, N. J. Its original work in basic and applied research in agricultural climatology and microclimatology, but in rec years the scope of its work has broadened to include studies in hydrology, plant site locati atmospheric and soil pollution, instrument development and phenology. The underl theme in all the research has been evapotranspiration and the moisture factor in climate. recent activity has been that of site evaluation for industry with special interest in sites for construction of nuclear reactors. Reports of the research done at the Laboratory are publis in a series entitled **Publications in Climatology.** Its student training program is planne conjunction with the University of Chicago. The sponsorship of the Laboratory has shif from Johns Hopkins University to Drexel Institute to C. W. Thornthwaite Associates. Laboratory was organized by C. W. THORNTHWAITE whose major interest for almost th years has been evapotranspiration and the water balance at the earth's surface. Under

rrangements the Laboratory begins its third phase as the C. W. Thornthwaite Associates aboratory of Climatology. *Subject Headings:* **1. Climatology laboratories 2. Laboratory of limatology, Centerton, N. J.**—*E.Z.S.*

12.10–53 551.501.9:551.43:061.3(969)

Price, Saul (*U. S. W. B., Honolulu, Hawaii*) and Pales, Jack C. (*U. S. W. B., Mauna Loa bs., Hawaii*), **The Mauna Loa High-Altitude Observatory.** *Monthly Weather Review*, Wash., . C., 87(1):1–14, Jan. **1959.** 13 figs., 4 tables, 19 refs. **DWB, DLC**—A description is given f the physical setting, facilities and current program of the Mauna Loa High-Altitude Observatory. Observations are being made on local weather; continuation of IGY programs in tmospheric composition and solar radiation. Mountain circulation and climate and also tmospheric interrelationships will be investigated. Observations will be made on the vertical radients of ozone and carbon dioxide along the mountain slopes and in the nearby free air. he freedom of the site from pollution makes it well suited to baseline observations of atmospheric electricity, and measurements of conductivity, potential gradient, and ionization rate re being planned. *Subject Headings:* **1. Mauna Loa High-Altitude Observatory 2. Mauna oa, Hawaii.**—*E.Z.S.*

12.10–54 551.5:061.6(73)

A National Center for Atmospheric Research: Walter Orr Roberts named director. *Weatherwise*, Boston, 13(4):139–140, Aug. **1960.** Photo. **DWB**—A report on the activities f the National Center for Atmospheric Research. The Center will coordinate the activities and lan the research on atmospheric science using the resources of engineering, chemistry, physics nd mathematics. The Center will largely concentrate on those problems which cannot be ealt with by individual groups. Recently, WALTER ORR ROBERTS was appointed Director f the Center. *Subject Headings:* **1. Atmospheric research 2. National Center for Atmospheric esearch 3. Roberts, Walter Orr.**—*A.H.K.*

A9. CONFERENCES—SYMPOSIA

See also: **Frost protection conf.** (Burckhardt), **12.10–86**; **Sci. conf. on Problems of Forecasting Continental Waters** (Rakhmanov), **12.10–389.**

12.10–55 551.5:629.13:061.3

Langlo, K. and Veranneman, N. L., **Aeronautical meteorology meetings in Montreal, 1959.** *World Meteorological Organization, WMO Bulletin*, 9(1):24–28, Jan. **1960. DWB, DLC**—At he meetings of the International Civil Aviation Organization in Montreal, September 1–29, 959, the means whereby meteorology and meteorological services of the world can best be used n meeting modern aeronautical requirements were discussed. The agenda included aircraft eteorological reports, flight documentation procedures, radio-telephoned meteorological nformation, enroute forecasts and their accuracy, aeronautical meteorological codes, climatogical requirements and technical facilities. *Subject Headings:* **1. Aeronautical meteorology eetings 2. International Civil Aviation Organization.**—*N.N.*

12.10–56 551.509.33:061.3

Lu-Wu, **Conference for medium and long-range forecasting and weather analysis over lateau region.** *Acta Meteorologica Sinica*, Peking, 30(1):45–54, Feb. **1959.** In Chinese. **LC**—Under the impact of the scientific revolution of 1958, 35 research papers out of some 56 ealt with analyses of atmospheric circulation in the surface and upper layers and of cold fronts n the plateau region of Tibet and N.W.–S.W. China. At present, more than 90% of the long ange forecasts are successful even in Inner Mongolia and Fukien Province. Proposals were ade for a 3-yr program, including decentralization of technical operations, specialization of hort range forecasting in every Province, and functional cooperation between agencies. The onference concluded in the hope of achieving accepted international standards within the 3-yr rogram. *Subject Headings:* **1. Long range forecasting conferences 2. Chinese Meteorological ervice 3. Tibetan Plateau.**—*K.C.*

12.10–57 550.3:061.3(9

The Special Committee on Antarctic Research (SCAR). *International Council of Scienti Unions, ICSU Review*, 1(4):203–211, Oct. **1959.** Report of three meetings of SCAR (Speci Committee on Antarctic Research) held 1) in the Hague, Feb. 3–5; 2) in Moscow, Aug. 4–1 1958 and 3) in Canberra, March 2–6, 1959.—The area of interest of SCAR is indicated. T scientific investigations recommended by SCAR at the first and second meetings are presente The investigations are concerned with meteorology (general, synoptic observations, speci observations, atmospheric nuclear radiation, rockets, weather control), ionosphere, auror physics, geomagnetism, cosmic rays, geology, glaciology, geomorphology, cartography, se mology, gravity, vulcanology, oceanography, marine biology, biology and physiology. T resolutions concerned with international cooperation adopted at the second meeting are give At the third meeting the member countries reported on their planned programs for 1959–19 Six Working Groups were formed and a report is presented regarding their resolutions cartography, meteorology, biology and oceanography, exchange of information, and phys of the high atmosphere. *Subject Headings:* **1. Antarctic research 2. Special Committee Antarctic Research.**—*A.V.*

12.10–58 551.5:550.3(08) 551.506.22(9

Weill, G., **Symposium Antarctique.** [Antarctic symposium.] *France. Ministère de France d'Outre-Mer, Terres Australes et Antarctiques Françaises*, No. 11:3–7, April/June 19 **DLC**—A short report on the symposium held at Buenos-Aires, Nov. 15–25, 1959, the obj of which was the presentation of the first results of the IGY in the Antarctic. This symposiu was attended by the delegations of 13 countries: South Africa, Argentina, Australia, Belgiu Brazil, Chile, U. S., France, United Kingdom, Japan, Norway, New Zealand and U.S.S. The numerous reports presented and discussed during the work sessions were grouped accordi to 9 disciplines: Geography-exploration, Meteorology, High atmosphere physics, Geom netism, Cosmic rays, Oceanography, Glaciology, Geology (geochemistry) and Biology (phy ology). The author reviews the progress made in these disciplines during the IGY, principa for the Antarctic regions. *Subject Headings:* **1. Antarctic symposia 2. Buenos Aires, Arge tina.**—*A.V.*

12.10–59 551.553.21(

*†Symposium on Monsoons of the World, Meteorological Office, New Delhi, Feb. 19– 1958, [**Proceedings**]. Ed. by S. Basu et al. Held under the auspices of the Internatio Union of Geodesy and Geophysics, World Meteorological Organization, International Asso tion for Meteorology and Atmospheric Physics and the Government of India. Printed N Delhi, **1960.** 270 p. figs., tables, refs. throughout. For listing of contents, *see* 12(3):6 March 1961, *Met. Abs.* These articles abstracted separately. **DWB** (M53.21 S989s Review in *Royal Meteorological Society, Quarterly Journal*, 87(373):460, July **1961.**—Pap were presented at the symposium in the following areas: **I. Climatology of the monsoons surface and upper air; II. Monsoons and the general circulation; III. Dynamics of the m soons; IV. Depressions and other perturbations in the Monsoon; V. Rain and clouds of monsoons; VI. Variability of the monsoons; VII. Forecasting of the monsoon—extended a long range.** *Subject Headings:* **1. Monsoon symposia 2. New Delhi, India. I. Basu, S.** (*e*

A10. EDUCATION—HISTORY—BIOGRAPHY—BIBLIOGRAPHY

Education

12.10–60 551.5:378.4(7

New meteorology program at Oregon State College. *American Meteorological Soci Bulletin*, 40(11):589–590, Nov. **1959.** photo. **DWB, DLC**—A new program for meteorol was inaugurated at Oregon State College in June 1959. A student can qualify for the certifi of professional preparation in meteorology by completing course requirements totalling 30 t hours. The courses include Basic Meteorology, Synoptic Meteorology, Meteorology, Gen Physics, etc. Students majoring in closely related fields will be able to qualify for professio

status as defined in U. S. Civil Service announcements. *Subject Heading:* **1. Meteorology education.**—*A.H.K.*

12.10–61 551.5:378.9:061.2(410)

Meteorology field course. *Weather*, London, 14(1):31, Jan **1959.** Also: Collier, J. T., **Meteorology at Preston Montford.** *Ibid.*, 26–29, Jan **1959.** 2 photos. Also: Edwards, F. J., **Weather and flight: Preston Montford, 1958.** *Ibid.*, :29–30, Jan. **1959. DWB**—The first paper discusses a proposed course at Preston Montford, between April 8–15, 1959, organized by the Royal Meteorological Society and Field Studies Council. The names of the lecturers, tentative program and time table of lectures are presented. The last two papers are notes on two meteorological courses: one was a course for Sixth Formers run by the Royal Meteorological Society, held last year from Aug. 30 to Sept. 6, and the other course "Weather and Flight" was held from Sept 20–27, 1958. The details of the courses, the membership, duration, duties and routine are described. *Subject Headings:* **1. Meteorology education 2. Meteorology field courses.**—*I.S.*

12.10–62 551.5:061.1(410):378

Gordon, A. H., **Twenty years after: the story of the Meteorological Office Training School.** *Meteorological Magazine*, London, 88(1047):257–262, Oct. **1959.** ref. **DWB, DLC**—Sept. 15, 1939 marked the official opening of the Meteorological Office Training School. Since that time the training school has developed its functions and expanded its scope, both in material resources and approach to teaching meteorology. Stanmore, Middlesex, is the present location of the school to which it moved in 1951. The present paper discusses the aim and purposes of the school and describes different courses offered by the school. These include courses for scientific officers, initial forecasting, advanced forecasting for senior forecasters, climatology, assistants, synoptic chart analysis and various optional courses. The status of the school as an international training center, where overseas students come to get training in meteorology, is also described. *Subject Headings:* **1. Meteorology training schools 2. British Meteorological Office Training School.**—*I.S.*

12.10–63 551.5:378

Havens, James M., **Has meteorology a place in liberal education?** *Weather*, London, 13(4):131–134, April **1958. DWB**—The arguments presented by KRAUS and GREEN for including meteorology in liberal arts courses are contradicted and the question as to whether meteorology should be taught in the Geography of the Physics Dept. was resolved by concluding that it shouldn't be taught at all, (in liberal arts) since it is essentially an applied science and does not teach the true scientific method. Meteorology has a place in secondary school, technical schools, Boy Scout instruction etc. on one hand, and in advanced professional or specialized courses involving extensive knowledge of mathematics and physics on the other. *Subject Headings:* **1. Meteorology education 2. Liberal Arts meteorology courses.**—*M.R.*

12.10–64 551.5:378(09)(477)

Dubinskiĭ, G. P., **Meteorologiia i klimatologiia v Khar'kovskom Universitete.** [Meteorology and climatology at the University of Kharkov.] *Kharkov. Universitet, Uchenye Zapiski*, 56:57–68, **1956.** photos. **DLC** (AS262.K415)—The history of meteorological and climatological instruction at Kharkov University (founded 1805) under various Departments such as that of Physical Geography, Physics, Astronomy, or Physical-Mathematical Faculty, and the professors who taught the courses, are outlined in detail. The work of PROF. V. I. LAPSHIN is given special mention, as he started observations at Kharkov in 1841, and compiled the first summary of climatic conditions at Kharkov, using data for 1841–48, and a more comprehensive climatology in 1855. He also constructed an anemograph that was exhibited at London in 1862. IU. I. MOROZOV carried on until 1900, D. K. PEDAEV from 1900–1933 during which time he published 40 scientific works and more recently P. L. TOMASHEVICH (1936) and the author (1936-date). Extensive references to works by these and other authors working at the Univ. are found on p. 74–76 of Tom 2, 1955. *Subject Headings:* **1. History of meteorology education 2. Teaching of meteorology 3. Kharkov University 4. Kharkov, Ukrainian S.S.R.**—*M.R.*

History

See: **Searchers of the sea** (Daugherty), 12.10–34; **Met. and climat. at the Univ. of Kharkov** (Dubinskiĭ), 12.10–64; **Alibag Magn. Obs., 1904–1954** (Basu et al.), 12.10–192.

Biography

See also: **Collected works** (Prandtl), 12.10–6; **Searchers of the sea** (Daugherty), 12.10–34.

12.10–65 551.5:92

Bleeker, Wouter, [**Biographical sketch of**] **Dr. H. G. Cannegieter** [**on his 80th birthday**]. *Hemel en Dampkring, The Hague*, 57(6):137–138, June **1959.** photo. **DWB, DLC**—Cannegieter had his 80th anniversary on July 19, 1959. He retired in July 1945, after 34 yrs of service at the K.N.M.I. at De Bilt (The Netherlands). His publications are in the field of aerology and international administration. Together with Van Everdingen, he was convinced that meteorologists must be informed about the upper atmosphere in order to get a good understanding of the various atmospheric processes. In the development of aviation, Cannegieter saw the great possibilities of meteorology. In the beginning he used to fasten the instruments on airplanes for the first weather-flights. His idea was followed in Germany, England and later on also in France and Scandinavia. Cannegieter was very interested in radiosounding and in 1931 he received the first instruments from Russia. The aerological station at Reykjavik (Iceland) was also organized by Cannegieter. He personally made the radiosonde observations in the beginning. He obtained his balloonist's certificate and made ascents. Because of his knowledge of languages, he became an international personality. He was secretary at the I.M.O. and his **Publication** No. 9 of the IMO(WMO) was the manual for the meteorological services. Cannegieter was director of the K.N.M.I. at De Bilt in 1939. *Subject Headings:* **1. Biography of H. G. Cannegieter 2. Cannegieter, H. G.**—*A.V.*

12.10–66 91.04(98) 551.5:92

Shackleton, Edward, **Nansen, the explorer.** London, H. F. and G. Witherby, **1959.** 209 p. photos, map. **DLC** (G635 N3S3)—Fridtjof Nansen, the Norwegian pioneer explorer of Greenland and the Arctic Ocean, was born in a suburb of Oslo on Oct. 10, 1861. He was deeply devoted to marine biology, oceanography and meteorological observations. At the age of 26 he led the first Norwegian expedition (1888) across the pack ice and icebergs of the Arctic Ocean and was able to cross the cold icy region from Umivik on to Godthaab. Several other trips he made are reported. His investigations contributed to modern day weather forecasting. He was honored by international geographical societies for a singular record of being the first to discover the nature of the Arctic Ocean. He died on May 13, 1929 and was buried on Norway's National Day, May 17. *Subject Headings:* **1. Biography of Fridtjof Nansen 2. Nansen, Fridtjof.**—*N.N.*

12.10–67 551.5:9

Dufay, Jean, [**Obituary of**] **Jean Cabannes.** *Annales de Géophysique*, Paris, 16(3) 299–303, July/Sept. **1960.** photo. **DLC**—Jean Cabannes entered the Teachers' training college in 1906; passed his examination in 1911 and took his Doctor's degree in 1921. He was an assistant at the Faculty of Sciences of Marseilles, Lecturer and then Professor at the Faculty of Sciences of Montpellier and later Professor at the Sorbonne (1937). He was a member of the Academy of Sciences at Paris and of numerous foreign learned societies. His scientific work is considerable and mainly deals with optics, spectroscopy and molecular physics. Apart from these works, he made great contribution to atmospheric optics. He gave a direct experimental confirmation of the molecular diffusion and atmospheric absorption theory of Lord Rayleigh. He designed a spectrograph especially meant for the spectral study of the night sky glow. He was one of the first to establish the presence of sodium in the upper atmosphere. His works and investigations on the forbidden lines in the solar absorption spectrum are also very well known. The services of Cabannes to geophysics, meteorology and astronomy were not confined to his professional work; his writings, teaching and his personal example have been instrumental in attracting numerous young physicists to the study of astrophysics and the

pper atmosphere. *Subject Headings:* **1. Obituary of Jean Cabannes 2. Cabannes, Jean.** *-A.V.*

12.10–68 551.5:92

†Skeib, G., **[Obituary of] Dr. Fritz Schindelhauer.** *Zeitschrift für Meteorologie*, Berlin, 3(9/10):201–204, Sept./Oct. **1959.** photo. Listing (29) titles of Dr. Schindelhauer's works, . 203–204. **DWB, DLC**—After early studies in Brandenburg and Aachen, SCHINDELHAUER eceived his doctorate in 1913 from Berlin University. His doctoral dissertation was on recipitation electricity. From the close of World War I to 1956, he was associated with the otsdam Observatory, serving as chief advisor in the 1930's. His life's work was anchored in he problems of atmospheric electricity, especially the relationship of atmospheric to synoptic eather events. During World War II, he was engaged by the military weather service to nvestigate the utility of sferics data for forecasting weather in the North Atlantic, where egular observations were lacking. While synoptic meteorologists were critical of the results, is felt that SCHINDELHAUER's pioneering work will ultimately prove of great value. The ncreased interest in atmospherics is proven by the establishment of sferics networks by many ations. *Subject Headings:* **1. Obituary of Fritz Schindelhauer 2. Bibliography of Fritz chindelhauer 3. Schindelhauer, Fritz.**—*R. S. Quinoz*

12.10–69 551.5:92

[Obituary of] Norman Randolph Hagen. *American Meteorological Society, Bulletin*, 0(11):553, Nov. **1959.** photo. **DWB, DLC**—NORMAN R. HAGEN, Public Information oordinator of the U. S. Weather Bureau died on Aug. 15, 1959. He joined the Weather ureau in 1928 and served in various capacities. After the second World War he was repre- entative of the Bureau in European countries. In 1952, he returned to Washington and erved as aviation weather specialist. *Subject Headings:* **1. Obituary of Norman Randolph agen 2. Hagen, Norman Randolph.**—*A.H.K.*

BIBLIOGRAPHY

See also: **Alibag Magn. Obs.** (Basu et al.), 12.10–192.

12.10–70 551.5:016

†Akademiia Nauk SSSR. Komitet po Geodezii i Geofizike, **Soobshchenie o nauchnykh abotakh po meteorologii i fizike atmosfery 1957–1959gg. Predstavliaetsia v Mezhdunarod- uiu Assotsiatsiiu Meteorologii i Fiziki Atmosfery k XII General'noĭ Assamblee Mezhduna- odnogo Geodesicheskogo i Geofizicheskogo Soiuza.** [Information on scientific works on meteorology and atmospheric physics, 1957–1959. Presented to the International Association of Meteorology and Atmospheric Physics for the XII General Assembly of the International Union of Geodesy and Geophysics.] Moscow, **1960.** 203 p. Almost entirely bibliographic itations. (For abstract on similar presentation to XI General Assembly, *see* 9.8–45, Aug. 958, *Met. Abs.*) **DWB** (M(016) A313sy)—References are divided into seven main sections, presenting monographs and articles as follows: 1) Climatology, (688 refs.); 2) Synoptic mete- rology (429 refs.); 3) Dynamic meteorology (128 refs.); 4) Atmospheric optics and actinometry 322 refs.); 5) Physics of clouds and precipitation (179 refs.); 6) Physics of the layer near the round and of atmospheric turbulence (174 refs.) and 7) Atmospheric electricity (91 refs.). *Subject Headings:* **1. Meteorology bibliographies 2. Atmospheric physics bibliographies.**— *M. B. Chung.*

B. APPLICATIONS

B1. AERONAUTICS

See also: **Aeronaut. met. meetings, Montreal, 1959** (Langlo, Veranneman), 12.10–55.

12.10–71 551.506.3:656.71(480)

*Nurminen, Aili, **Aeronautical data from Helsinki Airport for the years 1953–1957. *Finland. Ilmatieteellinen Keskuslaitos, Toimituksia*, No. 46, **1958.** 19 p. fig., 12 tables.

DWB—The introduction to this statistical study describes the physical aspects of the airpo from which the 3-hr observations for Dec. 1, 1952–Nov. 30, 1957 are summarized and inclu hourly observations for all hydrometeors. The tables include diurnal and seasonal distributi of winds, their direction and speed, visibility and ceiling; general flight conditions and accordi to wind directions and speeds; hydrometeor, surface fogs and haze as well as temperatures terms of seasonal and annual means. The most frequent winds are of 4–6 knots of SSE–SS and WNW directions Fogs occur on the average of 67 days a year, duration 3.9 hr, mist days, 2.1 hr, surface fog 44 days, 2.1 hr, haze 29 days and with a maximum duration of 19–20 h Minimum temperature −34°C, maximum 30°C. *Subject Headings:* **1. Airport meteorologic data 2. Helsinki, Finland.**—*W.N.*

12.10–72 551.58:656.71(48

*Venho, S. N., **A study of meteorological conditions at Luonetjärvi Airport.** *Finlan Ilmatieteellinen Keskuslaitos, Toimituksia*, No. 47, **1958.** 23 p. 10 tables. **DWB, DLC**—T meteorological observations made at Luonetjärvi Airport (62°24′N, 25°40′E), Finland, betwe Dec. 1, 1946 and Nov. 30, 1956 are tabulated. The cloud base determinations were made pilot balloons and on postflight reports of pilots wind speed and wind direction were determin by means of a Väisälä cup anemometer until 1952 and after that by means of a Fuess an mometer. *Subject Headings:* **1. Airport meteorological data 2. Luonetjärvi, Finland.**—*I.S.*

12.10–73 551.506.7:629.1

Partl, Willibald and Tank, H. J., **Atmosphärische Vorgänge aus der Scau eines Verkehr flugzeugführers.** [Atmospheric experiences of a commercial airplane pilot.] *Meteorologis Rundschau*, Berlin, 13(2):57–61, March/April **1960.** 8 figs., English summary p. 57.— pilot, who has his daily experience about the irregularities in air currents particularly on lo haul flights over the North Atlantic, has drafted his suggestions about reasons and influences special kinds of wind situations. The paper should be a proposal to initiate more discussio between scientists in meteorology and their practical consumers. *Subject Heading:* **1. A current observations by aircraft pilots.**—*Authors' abstract.*

12.10–74 551.506.1:629.13(71

Wilson, H. P. and Markham, W. E. (*both, Arctic Forecast Team, Canadian Met. Div*) **1951 aviation weather summaries for selected Canadian Arctic stations.** *Canada. Meteo logical Division, Circular* 2094, Tec. 112, April 21, **1952.** 5 p. 4 tables, ref. **DWB**—Month average percentages of time for ceiling and visibility conditions in 1951 are given for 10 Arc stations and are briefly discussed. *Subject Headings:* **1. Aeronautical meteorology 2. Ceili 3. Visibility 4. Canadian Arctic.**—*A.A.*

B2. ASTRONAUTICS

See also: **Space research: Proceedings of First Symposium, Nice, 1960** (Bijl, *ed.*), 12.10–3; **Tables and nomograms for processing satellite obs.** (Zhonogolovich, Amelin), 12.10–29.

12.10–75 551.507.362.2:521.312:551.521

Bartels, Julius (*Geophys. Inst. Univ. Göttingen, Germany*), **Geophysical evidence beari on orbital variations of satellites and on the radiation belts.** *International Space Scie Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. 19 p. 841–844. 11 refs. Russian summary p. 841. **DWB** (523.1 I61sp)—Observed orbital variatio of satellites as well as the newly discovered radiation belts and their fluctuations, are rela to known physical phenomena, which have been observed for several decades. The followi subjects have been discussed in detail: 1) auroral height measurements,which show enormous increase in northern latitudes during intense magnetic storms; 2) large lunar ti effects in the ionosphere, which are possibly generated at several Earth's radii distanc 3) two types of 27-day periods: a) solar wave radiation and b) solar corpuscular radiati *Subject Headings:* **1. Satellite orbital variations 2. Auroral height measurements 3. Lun tidal effects in ionosphere 4. Solar wave radiation 5. Solar corpuscular radiation.**—*Autho abstract.* Ⓢ

12.10–76 551.507.362.2:551.576.1:778.3

Faust, Heinrich, **Die wissenschaftliche Bedeutung des Wettersatelliten Tiros 1.** [Scientific importance of weather satellite Tiros 1.] *Weltraumfahrt*, Frankfurt a.M., 11(3):73–77, Sept. **1960.** 7 figs. **DLC**—An article in four sections: Pt. 1, the first continuous photography of our planet is described as a new epoch in meteorology. Part 2, a detailed account is given of the technical instrumentation and function of the Tiros satellite. Pt. 3, the sight of clouds from the ground and from the sky are discussed. Pt. 4, the scientific values of the Tiros pictures are treated. They offer an improved observation method to research workers in meteorology. The change of cloud formations presented by satellite pictures are more rapid, more simple and are easier to understand than it has been before. *Subject Headings:* **1. Weather satellites 2. Satellite Tiros I photographs 3. Satellite cloud photographs.**—*E.K.* Ⓢ

12.10–77 551.507.362.1:621.397:525.14

Hubert, Lester F.; Fritz, S. and Wexler, H. (*all, U. S. W. B., Wash., D. C.*), **Pictures of the Earth from high altitudes and their meteorological significance.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 3–7. 5 figs., 3 refs. Russian summary p. 3. **DWB** (523.1 I61sp)—Rocket pictures provide an excellent preview of an important new source of meteorological data that will soon be available from satellites equipped with television cameras. A mosaic picture, resulting from a moving picture of the Atlas flight of Aug. 24, 1959 is presented. It illustrates the meteorological potential of cloud pictures taken simultaneously over millions of square miles. While a television picture will not have the same resolution as the Atlas film, it will show significant cloud patterns. This is illustrated with the aid of two versions of a rocket photograph mosaic taken over Texas in Oct. 1954. The original version of the mosaic shows macro- and mesoscale meteorological phenomena including an upper vortex; the second version has been scanned with 250 lines to simulate satellite television pictures. Despite the low resolution of the simulated picture, significant features are still visible. *Subject Headings:* **1. Satellite television pictures 2. Satellite photographs of Earth 3. Satellite photographs of Earth's weather conditions.**—*Authors' abstract.* Ⓢ

12.10–78 551.507.362,2:778.3(267.5)

Red Sea viewed by weather satellite. *Science*, Wash., D. C., 131(3407):1086, April 15, **1960.** photo. **DLC**—A view of the Red Sea from an altitude of 450 mi, taken by Tiros I during its 43rd orbit, its first week aloft. *Subject Headings:* **1. Weather satellites 2. Tiros I 3. Red Sea.**—*E.Z.S.* Ⓢ

12.10–79 551.507.362.2:521.312

King-Hele, D. G. (*Royal Aircraft Estab. Farnborough, Eng.*), **Method for determining the changes in satellite orbits due to air drag.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 8–23. 10 figs., 17 refs., 21 eqs. Russian summary p. 8. **DWB** (523.1 I61sp)—This paper gives the results of a theoretical study (1) on satellite orbits of eccentricity less than 0.2 contracting under the influence of air drag. Equations and graphs are presented which show how orbital period and perigee distance vary with eccentricity and how each of these quantities varied with time. *Subject Headings:* **1. Satellite orbital eccentricities 2. Air drag effects on satellite orbits.**—*Author's abstract.* Ⓢ

12.10–80 523.164.3:551.507.362.2

Getmantsev, G. G.: Ginzburg, V. L. and Shklovskiĭ, I. S., **Radioastronomicheskie issledovaniia s pomoshch'iu iskusstvennykh sputnikov Zemli.** [Radioastronomical research using the artificial earth satellites.] *Uspekhi Fizicheskikh Nauk*, Moscow, 66(2):157–161, **1958.** 11 refs., eqs. **DLC**—The possibilities of using the artificial earth satellite for studying the radio radiations from the sun, moon, and planets in space without interference by the earth's atmosphere or ionosphere are dwelled on at length with mathematical and physical, as well as instrumented details regarding absorption in the atmosphere "windows." *Subject Headings:* **1. Radioastronomical observations from satellites 2. Satellite radioastronomy observations.** —*M.R.*

12.10–81 551.507.362.2:550.380.8 550.385.43:523.746

Coleman, P. J., Jr.; Sonett, C. P.; Judge, D. L. et al. (*all, Space Technology Labs., Calif.*), **Some preliminary results of the Pioneer V magnetometer experiment.** *Journal of Geophysical Research*, Wash., D. C., 65(6):1856–1857, June **1960.** 2 figs., 5 refs. **DLC**—We have substantiating evidence for annular closure about the earth of the current system found by the Explorer VI flight. Large fluctuations in the measured component in the geocentric range between 60,000 and 100,000 km were observed. The diminution in amplitudes of these fluctuations indicates that they lose a large fraction of their energy in the region of seven to thirteen earth radii. The zone of magnetic activity observed by both Pioneer I and V may be related to a termination of the magnetic field at approximately fourteen earth radii. The sudden increases in magnetic field strength during solar activity and the apparent existence of a quiet time field perpendicular to the ecliptic suggest that collisionless magnetoacoustic waves may be formed in the interplanetary medium. But such waves may be generated as a boundary phenomenon at the interface between the geomagnetic and interplanetary fields. *Subject Headings:* **1. Satellite-borne magnetometers 2. Solar-magnetic relationships 3. Magnetic field variations 4. U. S. satellite, 1960 Alpha (Pioneer V).**—*E.Z.S.* Ⓢ

12.10–82 551.507.362.2:535.33:551.521.17

Aller, Lawrence H. (*Obs. of Univ. of Michigan*), **Some aspects of ultraviolet satellite spectroscopy.** *Astronomical Society of the Pacific, San Francisco, Publications*, 71(421):324–329, Aug. **1959.** 3 figs., 9 refs., 2 eqs. **DLC**—A graphically illustrated discussion of the anticipated intensities of some of the stronger lines beyond the atmospheric cutoff at λ2900. The paper concentrates on the early spectral classes. In order to illustrate the magnitude of the intensities involved calculations for the two strongest lines in the region λ2900–1000, i.e., Lyman α and the Mg II pair at λ2796 and λ2803 are given. It is concluded that in the observations between the beginning of the Lyman series and the soft x-ray region the neutral hydrogen in the solar system and in interstellar space will cause serious complications. *Subject Headings:* **1. Satellite uses 2. Ultraviolet spectra 3. Spectroscopy.**—*I.S.* Ⓢ

12.10–83 551.507.362.2:551.521.18

Wexler, Raymond (*Allied Res. Associates, Boston, Mass.*), **Interpretation of satellite observations of infrared radiation.** Allied Research Associates, Inc., Boston, Contract AF 19(604)-5968, Scientific Report, No. 1, April 20, **1961.** 31 p. 14 figs., 2 tables, 7 refs., 5 eqs. **DWB**—Analysis of new experimental data by Burch shows that the atmospheric absorption by CO_2 in the 15μ band is somewhat less than previously supposed. Data on the temperature effect indicate that the atmospheric transmission increases by about 1% as the temperature decreases by 10°C. A theoretical analysis of the window region indicates higher transmission than those found near the surface by Taylor and Yates. There is fair agreement between theory and observation of the transmission curves over the interval. Infrared patterns superimposed on TIROS I cloud patterns provide information on the topography of cloud tops. In a developing cyclone, highest cloud tops are located to the east of the clear wedge penetrating the overcast area. For an upper level vortex, highest cloud tops are to the east or northeast of the 500 mb low pressure center. The total outgoing radiation from high clouds with temperature of −40 to −50°C is about one-half that emanating from clear areas with a surface temperature near 20°C. *Subject Headings:* **1. Satellite observations 2. Atmospheric absorption by CO_2 3. Cloud top topography 4. Infrared radiation.**—*Author's abstract.* Ⓢ

12.10–84 551.507.362.2:523.5

†Nazarova, T. N., **Issledovanie meteoronykh chastits na tret'em sovetskom iskusstvennom sputnike Zemli.** [Study of meteoric particles on the third Soviet artificial earth satellite.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 4:165–170, **1960.** 2 figs., 2 tables, 22 refs. **DLC**—The third Soviet artificial earth satellite was instrumented so as to record the number of particle collisions and the impulses of material ejected by a sensor. The latter was measured by means of a ballistic piezoelectric sensor. The electrical signals were divided according to amplitude into four ranges (channels) by means of an intensifier transformer which counted the number of signals in each channel. The results of measurements recorded on May 15, 1958 indicated the following: in spite of the large scatter of points (especially in apogee) there

was observed an essential minimum having a period of the order of 150 seconds. The minimum number of impacts was recorded by the sensor at the moment when the satellite was turned with the bottom towards the earth. At that time only the core was operating and the bottom only partially. The frequency of impacts varied with time during the flight of the satellite in its orbit. The phenomenon of considerable increase in impacts was observed only on May 15; on subsequent days the frequency of impacts was 3–4 times smaller. *Subject Headings:* **1. Artificial earth satellites 2. Soviet satellites 3. Meteoric particle impact measurement 4. Soviet satellite, 1958 Delta 2 (Sputnik -II).**—*I.L.D.* Ⓢ

12.10–85 551.507.362.1:523.51

Nazarova, T. N., **Rezul'taty issledovaniia meteornogo veshchestva s pomoshch'iu priborov, ustanovlennykh na kosmicheskikh raketakh.** [Results of studies of meteoric dust by means of Sputnik III and space rockets.] *Iskusstvennye Sputniki Zemli*, Moscow, No. 5:38–40, **1960.** table, 5 refs. **DLC.** Eng. transl. in *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 1059–1062. table, 5 refs. Russian summary p. 1059. **DWB** (523.1 I61sp)—Special recorders of impulses of the meteoric particles were installed in the 3rd artificial earth "Sputnik" (May 15, 1958) and in three space rockets: I) Jan. 2, II) Sept. 12 and III) Oct. 4 of 1959. The registration of impulses of masses of the meteoric particles within different ranges and different number of impulses was made as it is described in the text. The reception of signals from each rocket was analyzed and the apparatus of the following rocket readjusted for reception of impulses of other characteristics. Specifically large effect of impulses was observed in the "Sputnik" during May 15, 1958. The great number of impulses of large sizes were interpreted as the collision of the "Sputnik" with the meteoric stream. The registered results of all rockets and of the "Sputnik" are tabulated and commented on in the text. *Subject Headings:* **1. Soviet satellite, 1958 Delta 2 (Sputnik III) 2. Meteoric particle impacts on rockets 3. Meteoric stream effects on Sputnik III.**—*N.P.S.* Ⓢ

B3. AGRICULTURE

See also: **Agroclimat. charact. of sukhovei winds** (Tsuberbiller), 12.10–22; **Hydromet. regime of soil in rel. to new system of tillage,** (Iovenko), 12.10–222; **Temp. of irrig. soil** (Pletser), 12.10–233; **Agromet. forecasts, U.S.S.R.** (Kulik), 12.10–386.

12.10–86 551.509.612:551.524.371:631.548

Burckhardt, H. (*Offenbach a. M.*), **Richtlinien für die Frostschutzberegnung.** [Guide lines for frost protection sprinkling.] *Meteorologische Rundschau*, Berlin, 13(6):165–168, Nov./Dec. **1960.** 11 refs. **DWB, DLC**—After the failure of the sprinkling method of frost protection in 1957, a special conference was held at Stuttgart-Hohenheim in 1959. The conclusions and recommendations were modified as guidelines at a meeting held by the Ministry of Nutrition, Agriculture and Forests in Bonn in 1960. The effectiveness of sprinkling is determined by the heat balance of the plant. If the latent heat of water to small or evaporational cooling is too large then heat loss predominates and the plant freezes in spite of sprinkling (since evaporational cooling results from sprinkling). In the case of vines a particular developmental stage must be attained before sprinkling can be effective as a frost prevention measure since the latent heat of water becomes too small when the absorption area presented by the plant to the water is too small. Damage from sprinkling occurs when wind velocity exceeds 5 m/sec and relative humidity is less than 60%; under these conditions evaporational cooling exceeds any possibility of compensation by sprinkling. The use of wet bulb temperature is recommended since immediately after sprinkling and even before the release of latent heat the wet bulb temperature prevails. To avoid errors the wet bulb temperature is to be calculated from dry bulb temperature and hygrometric readings with the aid of an aspiration psychrometer table. From the values of dry bulb temperature and humidity the critical temperatures at which the wet bulb temperature is 0°C can be determined. The installation of the instruments, the observational routine, the sprinkling role for various crops, etc., are discussed. *Subject Headings:* **1. Frost protection conferences 2. Frost protection methods 3. Frost protection of vineyards 4. Frost protection sprinkling 5. Stuttgart-Hohenheim, Germany.**—*I.L.D.*

12.10–87 551.586:633.15

*Chirkov, Iu. I., **Otsenka agrometeorologicheskikh uslovii proizrastaniia kukuruzy.** [Evaluation of agrometeorological conditions for the growth of maize.] *Moscow. Tsentral'nyi Institut Prognozov, Trudy*, No. 98:6–17, **1960.** 2 figs., 10 tables, 14 refs., 9 eqs. **DWB**—On the basis of field and laboratory experiments, the author develops equations for calculating the agrometeorological conditions for the development of maize during the periods of sowing-germination and germination-appearance of tassels. The total effective temperature required by maize for the period of sowing-germination is given by the equation-

$$A = 83 + k(h-4)$$

where A = total effective temperature (>8°C) accumulated during the interval of sowing-germination, 83 = total effective temperature for the period when the seeds are covered to a depth of 4 cm., k = supplementary total of effective temperature necessary for each centimeter of increase in depth of the seeds, h = depth of the seeds. The formula for the duration of the period of sowing-germination (n = days) is

$$N = \frac{(1/C)\,[83 + k(h-4)]}{t-8}$$

where C = correction for soil moisture at the depth of seed, and t = soil temperature. It is shown that the agrometeorological conditions of maize during the sowing-germination period can be evaluated by plotting the rate of development ($1/n$ = rate per day) against soil temperature for different supplies of productive soil moisture in the 0–10 cm layer. For evaluating the agrometeorological conditions of maize development during the germination-tasseling period the duration of this period is determined on the basis of the relationship of the role of leaf formation to the atmospheric temperature. By introducing a correction for mean atmospheric temperature the relationship of a single interleaf period to the mean atmospheric temperature (t) is given by

$$N = \frac{30}{c(t-10)}$$

and the duration of the entire period of leaf formation (beginning with the third leaf of the budding of the tassel) is expressed by:

$$N = \frac{30(N+1)}{c(t-10)}$$

where $N+1$ = number of interleaf periods (N). The rate of leaf formation ($1/N$ = rate per day) plotted against atmospheric temperature gives a curve which yields an evaluation index of agrometeorological conditions. Application of these formulas are illustrated with the aid of actual data. *Subject Headings:* **1. Agrometeorological conditions for maize growth 2. Maize cultivation.**—*I.L.D.*

12.10–88 551.586:633.15

Drozdova, Z. P. and Svetlova, V. V., **Primenenie sposoba opredeleniia prirosta zelenoi massy kukuruzy.** [Use of the method of determining the growth of green mass of maize.] *Meteorologiia i Gidrologiia*, Moscow, No. 5:41–42, May **1960.** table, ref. **DWB, DLC**—A comparison of the weights of maize determined without cutting by the method of I. M. Il Chirkov. With actual weights determined by weighing showed that the deviation of the calculated from the actual weight was slight and was within the limits of several percent. A table giving the computed and actual weight of maize plants (according to data of the Ura Hydrometeorological Service in 1959) is presented. In order to facilitate calculations with Chirkov's formula, the author constructed a table for calculating the weight of a single plant from the height and diameter of the stems. The table is described. The deviations from the actual weight of this table were within 2–6%. *Subject Headings:* **1. Maize weight calculation 2. Maize cultivation.**—*I.L.D.*

12.10–89 551.586:632.1:338

Kamiyama, K. and Iesaka, T., **Study on the economical estimation of agrometeorological disasters, Pt. 1.** *Journal of Meteorological Research*, Tokyo, 11(5):408–424, May **1959.** 4 figs., tables. In Japanese. **DWB, DLC**—One of the urgent problems to be solved in agrometeorology in Japan is the control and management of the relationship between commercialization of crop products and various processes of circulation, although the cause of damage to agricultural products both in the chief and secondary staple production areas has been always the decrease throughout Japan. The author has statistically sought to find a solution which can explain and analyze the problem of price cycle, of variation of products in the ordinary and drought year, and supply and demand. The tables include a comparative investigation of variation of price and production of both beans and potatoes in Hokkaido and Japan, during the period, 1951–1955. *Subject Headings:* **1. Meteorological influences on crop production 2. Agricultural economics.**—*K.C.*

12.10–90 551.509.6:551.553.8:632.117.1:634.772(86)

†López, Manuel E. and Howell, Wallace E. (*both, W. E. Howell Associates, Inc.*), **The campaign against windstorms in the banana plantations near Santa Marta, Colombia, 1956–57.** *American Meteorological Society, Bulletin*, 42(4):265–276, April **1961.** 6 figs., 4 tables, 29 refs. **DWB, DLC**—Windstorms do great damage in banana plantations near the Sierra Nevada de Santa Marta in Colombia. These plantations, which owe their location to the rainfall maximum caused by convergence in the trade winds as they flow around the mountain massif, suffer most damage from the few most violent tempests and relatively little from the frequent milder squalls, offering the prospect that even slight mitigation of severe storms would be economically rewarding. Most damage was found to be triggered by easterly waves and similar large-scale disturbances, though the windstorms themselves remained purely local. Cloud seeding to attempt reduction of windstorm intensity was undertaken during the 1956 and 1957 seasons on the hypothesis that stimulation of showers early in the diurnal buildup of instability would dissipate some of the instability and reduce insolation at the ground, thus diminishing the intensity of later convective overturning. Comparison of damages during these seeded seasons with those of preceding and subsequent seasons showed a marked reduction in the ratio of severe windstorms to mild one during the campaign and a reduction perhaps as much as 39% in damages, worth several million dollars annually. *Subject Headings:* **1. Wind storm damage prevention techniques 2. Wind storm damage to bananas 3. Cloud seeding for windstorm reduction 4. Santa Marta, Colombia.**—*Authors' abstract.*

12.10–91 551.586:581.14

Okushko, A. A., **Sravnitel'naia otsenka razlichnykh sposobov opredeleniia zhiznesposobnosti ozimykh kul'tur i mnogoletnikh trav v zimnii period na territorii SSSR.** [Comparative evaluation of various methods for the determination of viability of winter crops and perennial grasses during the winter in the U.S.S.R.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, no. 98:87–98, **1960.** 5 tables, 2 refs. **DWB**—In order to evaluate the most effective method for determining the viability of plants during the winter the following methods of raising plants were used: monolithic (usual), water (usual), water with a grating, and the simplified monolith. The determination of viability of winter crops was determined also by a method involving an examination of the growth tips of plants. These methods are described and the results of investigations as viability of clover, winter rye, winter wheat and lucerne carried out during 1956–1957 in various regions of the U.S.S.R. (Latvian S.S.R., Udmurt A.S.S.R., Penza; Kostromo, etc.) are presented in tables. The most reliable method for determining the viability of winter crops was found to be the water method. The method of growth tip examination is feasible only for a limited network of stations and scientific institutions. In order to eliminate the deficiencies characteristic of the water method of plant growth only glass and enamel vessels should be used. Water logging can be prevented by the supplementary use of a grating with openings for spreading the plants or vessels preventing deep submersions of the lower parts of the plant. The simplified monolith method for determining viability is most useful (with respect to accuracy, speed and time consumption) in extensive agrometeorological networks serving agricultural needs. *Subject Headings:* **1. Viability of**

plants during winter 2. Plant growth determination techniques 3. U.S.S.R.—*I.L.D. a author's conclusions.*

12.10–92 551.586:633.

†Ponomarev, B. P., **Otsenka agrometeorologicheskikh usloviĭ proizrastaniia ozimoĭ r v period ot vykhoda v trubku do sozrevaniia v Srednem Povolzh'e i prilergaiushchikh k ne raionakh tsentral'no-chernozemnykh oblasteĭ.** [Evaluation of agrometeorological conditio for the growth of winter rye from the time of the stalk formation to the time of ripeness in t Central Volga Region and the adjoining regions of the Central Black Earth Area.] *Mosc Tsentral'nyĭ Institut Prognozov, Trudy*, No. 98:18–23, **1960.** 2 figs., 11 refs., 2 eqs. **DWE** The author attempts to establish a quantitative relationship between the height of winter r at termination of growth which characterizes the period of stalk formation, to flowering, a the agrometeorological conditions in the Central Volga Region and adjacent Central Bla Earth Area. The largest correlation coefficients were obtained between the final height of t plants and the moisture supply in the meter layer of the soil during stalk formation and t atmospheric moisture deficit during the period of stalk formation-flowering ($r = 0.84 \pm .00$ With this large correlation coefficient it is possible to compute with high probability regression equation:

$$Z = 0.36x - 5.86y + 128$$

where Z = terminal height of plants (during terminal growth), x = productive supply of moist in the meter layer of the soil during stalk formation, y = mean moisture deficit during the per of stalk formation-flowering. Also correlation coefficients between the weight of 1000 gra of rye and moisture expenditure from the meter layer of the soil during the period of floweri waxy ripeness of winter rye and between mean atmospheric temperature were 0.62 ± 0.06 a 0.63 ± 0.06 respectively. The aggregate correlation coefficient was 0.78 ± 0.04. This enab the calculation of the regression equation:

$$Z = 0.19x - 2.66y = 122.98$$

where Z = weight of 1000 grains of winter rye, y = expenditure of moisture (in mm) in the me layer of the soil during the period of flowering-waxy ripeness and y = mean atmospheric te perature during the period. Graphs of these regression equations are presented and th application is illustrated. *Subject Headings:* **1. Agrometeorological conditions for rye gro in winter 2. Central Volga Region, U.S.S.R. 3. Central Black Earth Area, U.S.S.R.**—*I.L*

12.10–93 551.586:633.

†Tsuberbiller, E. A., **Agrometeorologicheskoe obosnovanie nekotorykh priemov ag tekhniki vozdelyvaniia kartofelia.** [Agrometeorological principles of some agrotechn procedures of potato cultivation.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, 98:56–73, **1960.** 4 figs., table, 19 refs. **DWB**—A comprehensive study was carried out in principal climatic zones of the U.S.S.R. in order to determine the requirements of pot cultivation (1) in the zone of heat excess and moisture deficiency, (2) in the zone of moist excess and heat deficiency and (3) in the principle zone of potato cultivation, where the ag meteorological conditions are on the average close to the optimum but deviate from it consi ably in either direction during individual years. The results of investigations on data f the literature on the effect of various agrometeorological conditions and agricultural techni upon the formation and degeneration of tuber are presented. The effect of soil temperat at a depth of 10 cm and of soil moisture on the cultivation layer, 0–20 cm for different kin soil, the effect of planned and unplanned sprinkling, the effect of drought without sprin under different agricultural techniques and the effect of optimum agrometeorological conditi and of excess moisture are examined. The excess of yields in the northern U.S.S.R. over th in the principal central zone of potato cultivation is explained by the very favorable ag meteorological conditions during the period of tuber formation and by the highly develo agricultural techniques that are very suitable to the climate and weather conditions. I possible to establish favorable agrometeorological conditions for root formation in all climatic zones of the U.S.S.R., except on the tundra and desert regions if the methods of po

ultivation provide the following conditions: (1) that the soil temperature at a depth of 10 cm oes not exceed 23°C at 13 hours and (2) the supplies of productive soil moisture in the cultivation layer (0–20 cm) do not fall below 15 mm and do not rise to the limit close to 80% of field apacity. *Subject Headings:* **1. Agrometeorological conditions for potato cultivation 2. Agrotechnical procedures for potato cultivation 3. Potato cultivation 4. U.S.S.R.**—*I.L.D.*

12.10–94 551.506.8(058) 551.586:633.11

Ventskevich, G. Z., **Iz opyta rabot po kriticheskoĭ obrabotke fenologicheskogo materiala agrometeorologicheskikh ezhegodnikov.** [Practical experience in the critical analysis of phenological data from agrometeorological yearbooks.] *Moscow. Tsentral'nyĭ Institut prognozov, Trudy*, No. 98:99–108, **1960.** 3 figs., 5 tables, 6 refs., 6 eqs. **DWB**—The author presents a method of working up phenological data on wheat based upon the idea of expressing rate of development by a magnitude which is an inverse of the magnitude of the duration of the interphase period and on the assumption that the increase or decrease in rate is determined not only by the heat regime but also by other factors. In a statistical analysis of the number of variants characterizing the duration of the sowing-germination period of wheat under conditions of sufficient moisture the value $i=1/n$ for different mean daily temperatures was determined. The dependence of the rate of development of spring wheat upon temperature is expressed by:

$$i=i_0e^{at-bt^2}$$

where i = phenometeorological indicator, i_0 = initial value of indicator, t = mean daily temperature, a = parameter of acceleration, b = parameter of retardation ($I=1000\ i$). Under conditions of adequate soil moisture stalks of spring wheat will appear when 1000 i, equal to I, accumulate. The phenometeorological indicators for different growth phases in different regions of the U.S.S.R. were determined and their geographical variation is discussed. The dependence of development rate of plants upon such factors as soil moisture, duration of day and atmospheric humidity as well as upon atmospheric temperature is expressed by the equation

$$i=\alpha\beta\gamma i_0e^{at-bt^2}$$

where α = parameter characterizing the effect of duration of day, β = parameter characterizing the effect of humidity and γ = parameter characterizing the influence of atmospheric humidity. For spring wheat equations for the various parameters are as follows:

$$\alpha=1-0.1\ x$$

where x = the number of hours, showing the duration of the day at a given time of the year and at a given place, is less than the daylight part of the day at 60°N latitude in June; $\beta=0.03w-0.00025w^2+0.1$ where w = soil moisture (0–50 cm/layer) in per cent of complete moisture capacity; and $\gamma=0.018Z-0.0004Z^2+0.8$ where Z = magnitude indicating the extent to which the atmospheric relative humidity in 24 hours is less than 80%. *Subject Headings:* **1. Phenological data 2. Phenology of wheat 3. Agrometeorology yearbooks 4. U.S.S.R.**—*I.L.D.*

12.10–95 551.586:632.4:634.11

Zislavsky, Walter (*Vienna*), **Schorfwarndienst entwicklung und Bekämpfung des Schorfpilzes (Venturia inaequalis) mit besonderer Berücksichtigung des Witterungsablaufes in Österreich im Jahre 1959.** [Apple scab fungus warning service; development and control of the apple scab fungus (*Venturia inaequalis*) with particular consideration of weather conditions in Austria in 1959.] *Wetter und Leben*, Vienna, 12(9/10):215–220, **1960.** fig., table, refs. German and English summaries p. 215. **DWB**—The directed control of the apple scab fungus is based on the knowledge of ascospore ripening, ejaculation of the spores and conditions for infection. Using meteorological observations and investigations on the ripening and ejaculation of the spores, it was possible to analyze the development of the scab fungus in 1959 and to give recommendations for an optimal control. *Subject Headings:* **1. Apple scab fungus prevention techniques 2. Fungus diseases.**—*Author's abstract.*

B4. FORESTRY

12.10–96 551.509.6:581.9(21

Aubert de la Rüe, E. (*France*), **Man's influence on tropical vegetation.** *Pacific Scien Congress, 9th, Bangkok, 1957, Proceedings*, Vol. 20 pub. **1958.** p. 81–94. 19 refs. **DW** (M(06) P117p)—Attention is called to grave damages occurring in tropical nature by hum intervention. The tropical forests are vulnerable systems. As man causes the disappearan of the original vegetation cover, he introduces deep changes in the various tropical biotyp Microclimates and microflora are destroyed. As new aspects are substituted for the natu combinations there is a tendency toward a general uniformity of tropical nature with t development of secondary formations, the extension of large plantations and the ever-increasi spread of a cosmopolitan flora. Such changes in plant cover bring about the denudation enormous areas ruined and lost because torrential rains and runoff soon attack them and ca to the ocean a prodigious quantity of soil. Such activities pave the way for the surficial ha ening of lateritic clays which occurs more or less everywhere in the humid tropics and leads the irreversible sterilization of the soil. The discussion which followed is reported. *Subj Headings:* **1. Humid tropics 2. Tropical vegetation and man.**—*E.Z.S.*

12.10–97 551.509.6:632.1

Melekhov, I. S. (*Inst. Lesa i Lesokhimii ANSSSR, Arkhangel'sk*), **Uspekhi nauki o l (Vsemirnyĭ lesnoĭ kongress).** [Advances in silviculture (World Forestry Conference *Priroda*, Moscow, 2:84–87, Feb. **1961.** 5 photos. **DLC**—The World Forestry Congress w held during the fall of 1960 in Seattle, Wash. In this report on the Congress, the aut briefly discusses, among other things, the problem of forest fire prevention and control. T discussions at the Congress dealt with the nature of forest fires as an ecological factor, meth of combating forest fires including chemical ones. Also the role of forests in improving lo climate was taken up. *Subject Headings:* **1. Silviculture 2. Forest fire prevention techniqu** —*I.L.D.*

12.10–98 551.5:632.

†Morris, William G., **Influence of slash burning on regeneration, other plant cover, a fire hazard in the Douglas-fir region: a progress report.** *U. S. Forest Service. Pacific No west Forest and Range Experiment Station, Research Paper*, No. 29, July **1958.** 49 p. 20 fi 7 tables, 21 refs. **DWB, DA**—Slash burning on most patch cuttings does not increase decrease the numbers of post-logging seedlings, rather, it facilitates fire control. This concluded from an observation of 63 pairs of study plots in western Oregon and west Washington. Four distinct classes of ground surface were observed at a time to determine effect of the burn. Lists of commercial coniferous trees and of plants used as herb and br covers are appended. *Subject Headings:* **1. Slash burning effects on forest fire control 2. Sl burning effects on seedlings 3. Oregon 4. Washington (state).**—*N.N.*

12.10–99 551.584.41:551.521.16:551.571:551.5

Prignon, M., **Mesures microclimatiques en pessières agées: leur influence sur l'in duction des essences dites "sciaphiles."** [Microclimatic measurements in aged sp groves: their influence on the introduction of shade-bearer species.] *Société Royale Fores de Belgique, Bulletin*, 67(12):429–444, Dec. **1960.** 7 figs. **DA**—An analysis of microclim observations made in the course of 1959, an exceptionally dry year, with a view to characteri two distinct media in aged spruce groves; the microclimate of the properly so-called un brush and that of a clearing settled by a living canopy of variable denseness. The stud these observations has shown that not strictly so-called shade-bearer species exist, but shelt species which need a fresh atmosphere at the beginning of their growth. This fresh atmosp results from an equilibrium of luminosity-humidity in which the latter element plays a lea part. During dry years this equilibrium is upset, the relative humidity of the air and soil playing the minimum role. The experimental measurements corroborate and explain practical results obtained in plantings of so-called shade-bearer species made accordin various techniques in aged spruce groves; under normal shelter, under thin shelter or in l bare cuttings. During 1959, the luminosity and humidity presented exceptional values w

made it possible to work out the limit of physiological resistance of certain so-called shade-bearer species and especially the silver fir. *Subject Headings:* **1. Forest microclimatology 2. Light intensities in forests 3. Humidity in forests 4. Drought resistance of spruce.**—*A.V.*

12.10–100 551.515.3:632.117.1:634.94

Rossman, Fritz (*Deutsche Forschungsanstalt für Segelflug, München*), **Über Baumzerstörung durch Troben, besonders durch Verdrehen der Baüme.** [Destruction of trees by tornadoes, especially by twisting of trees.] *Meteorologische Rundschau*, Berlin, 12(5):161–162, Sept./Oct. 1959. 5 refs. **DWB, DLC**—Wegner, Martins and others have noted damages to trees which result from whirlwinds. However trees often grow asymmetrically in response to prevailing wind regimes. Their apparent twist in these instances are not due to whirlwinds or tornadoes. Both whirlwinds and tornadoes do, however, cause trees to be twisted and through the sudden and powerful twist to be split apart. *Subject Headings:* **1. Tornado damage to trees 2. Prevailing wind effects on trees.**—*E.Z.S.*

B5. MEDICINE

12.10–101 551.586:574

Brezowsky, H. (*German Weather Service, Bad Tölz*), **Wetterphase und Organismus.** [Weather phase and organisms.] *Umschau*, Frankfurt a.M., 60(16):495–499, Aug. 15, 1960. 2 figs., 6 photos, foot-ref. **DLC**—In the investigation of the relationship between weather and the response of the human organism weather processes are divided into two principle groups, namely "undisturbed" and "disturbed" weather. In the former the variation of the meteorological elements depends only upon daily incoming and outgoing radiation so that the normal periodicity is undisturbed. On the weather maps such weather situations are on the edge of a high pressure area, especially along its colder rim. Disturbed weather is associated with advection of air masses of different temperature and humidity. These weather groups are subdivided into several weather phases. Phases 1 and 2 belong to the undisturbed group and 3 to 6 to the disturbed group. The characteristics of the various weather phases are described with the aid of 2 diagrams and photographs. The biological responses of man to the individual weathers are outlined briefly. In general weather phases 1, 2 and 6 are associated with a diminution in disturbances of well being. The distribution of biotropic effects of biologically unfavorable weather phases as indicated by the incidence of embolisms, asthma, encephalitis, traffic accidents, deaths, etc. is discussed. *Subject Headings:* **1. Weather effects on man 2. Weather type classification.**—*I.L.D.*

12.10–102 551.586:551.524:551.571:616.988

†Mayyasi, Sami Ali, **Effect of temperature and humidity on virus infection. 1953.** Thesis (Ph.D.)—Ohio State Univ. 83 p. fig., 21 tables, bibliog. p. 78–82. "Authorized reprint of original ed., produced by University Microfilms, Inc., Ann Arbor, Mich., 1960." **DWB** (M86.621 M474ef)—A study of the effects of temperature and humidity on the capacity of the mucous membranes of the upper respiratory tract of mice to act as a portal of entry for intranasally inoculated poliomyelitis and influenza viruses. Some of the physiological responses were studied under conditions which appeared to change the resistance of the animals. Description of tests and results are given. *Subject Headings:* **1. Humidity and disease 2. Temperature and disease.**—*E.Z.S.*

12.10–103 551.586:616

Momiyama, Masako (*Met. Res. Inst., Tokyo*), **The geographical study of "seasonal diseases," Pt. 1, Tentative calendars of "seasonal diseases" in Japan.** *Meteorological Society of Japan, Tokyo, Journal*, Ser. 2, 38(1):47–60, Feb. **1960.** 6 figs. English summary p. 47: Japanese summary p. 60. **DWB, DLC**—It is well known that the occurrence of diseases and deaths is often connected with seasonal conditions, but there are not a few diseases which have little relationship with climatical and seasonal changes, and opinions differ among medical scientists as to the definition of seasonal diseases. In this paper, therefore, the author does not intend to discuss this point, but to present a tentative survey of death rates by disease and their geographical variations in prewar and postwar Japan. Thus, it is simply for con-

venience that those diseases for which the death rates fluctuate seasonally are regarded a "seasonal diseases" in this paper, but the author believes that some facts found in the seasona fluctuations of death rates by disease claim serious analysis and study from the standpoint o medical geography. *Subject Headings:* **1. Weather effects on mortality 2. Weather effects o diseases 3. Seasonal diseases 4. Japan.**—*Author's abstract.*

12.–10–104 551.586:551.510.42:617.

Renzetti, N. A. (*Air Pollution Foundation*) and Schuck, E. A. (*Stanford Research Inst.*) **Preliminary observations on the relationship between eye irritation in synthetic systems an in the atmosphere.** *Air Pollution Control Association, Pittsburgh, Pa., Journal,* 11(3):121–124 March 1961. 3 figs., 5 tables, 6 refs., organization chart. **DWB, DLC**—Briefly reported ar experiments conducted to relate eye irritation in synthetic systems to irritation observed i Los Angeles smog. In both sets of experiments human subjects were used. The subject were exposed in the test booths to irradiated mixtures of three *ppm* of certain hydrocarbon and one *ppm* of nitrogen dioxide in the laboratory experiments. The results obtained ar presented in tabular form. Parallel to these experiments the same test subjects were used t obtain eye irritation measurements in Los Angeles smog. The results, although insufficien and inconclusive, indicate a possible relationship between eye irritation in synthetic system and in the atmosphere. *Subject Headings:* **1. Smog effects on eyes 2. Smog research 3. Lo Angeles, Calif.**—*I.S.*

12.10–105 551.586:615.83

Jordan, H. (*Kardiologisch-Balneologische Forschungsstelle Bad Elster*), **Die Objektivierun von Kureffekten auf medikamentose Testriehen durch die mehrfache Streuungszerlegun** [Objective evaluation of the effects of health resort treatment on medicinal test series b multipole scatter analysis.] *Zeitschrift für Meteorologie,* Berlin, 13(1/6):108–110, Jan./Jun **1959.** 3 figs. German and English summaries p. 108. **DWB, DLC**—A statistical model given to explain mutual effects which result when medicinal and balneological treatment applied. *Subject Headings:* **1. Climatotherapy 2. Health resorts.**—*Author's abstract.*

12.10–106 551.586:615.83

Kalinowski, Marian and Snarski, Bogdan (*both, Posnan*), **Einfluss der Kurortbehandlun auf die Erhaltung der Leistungsfähigkeit alternder Menschen.** [The effect of health reso therapy on the maintenance of efficiency in aged persons.] *Zeitschrift für Meteorolog* Berlin, 13(1/6):100–104, Jan./June **1959.** 2 figs., 7 refs. German and English summari p. 100. **DWB, DLC**—The results of a four weeks health resort treatment on 261 mental ar physical workers, male and female, ranging from 50 to 65 years of age, have been investigate as to the efficiency of these persons. An inquiry was performed at the respective work-plac concerning absences due to illness, only official records being used. A comparison of t number of days-off due to illness during the 6-months interval prior to the treatment with corresponding period after shows a 74.4% decrease of morbidity and an 84.4% decrease of t number of days-off due to illness with 49 out of 100 persons. There were no absences due illness in 36.8% of cases, neither before nor after a treatment. 14.2% of employees showed 44.6% increase of morbidity, a total of days-off due to illness of 69.7%, a number whi includes persons hardly suitable for health resort treatment. These results lead to the co clusion that, provided indication and contra-indication are observed with care, the organis of senescent persons reacts particularly favorably to health resort treatment which should regarded as a major contributor in geriatrics. *Subject Headings:* **1. Climatotherapy 2. Heal resorts 3. Geriatrics.**—*Authors' abstract.*

12.10–107 551.586:613.

Schirgel, Lothar, **Akklimatisationsstüdien im Seeheilbad Heiligendamm.** [Acclimatiz tion studies at the Heiligendamm seaside resort.] *Zeitschrift für Meteorologie,* Berlin, 13(1/6 93, Jan./June **1959.** German and English summaries p. 93. **DWB, DLC**—An optimu therapy at sea-side health resorts and analyses of reactions to cures may be provided by t knowledge of the processes of acclimatization. The processes the organism undergoes wh adapting itself to the new average climatic milieu, and the possible various reactions p

dominantly caused by the changes of climatic conditions, should be studied. Therefore, to acquire better information on bioclimatic and balneological effects of seaside health resort treatment, since 1956 nearly twenty patients have been examined somewhat more thoroughly than usual during their four to six weeks cures as to vital capacity, circulation, metabolic processes, etc. The evaluation of these results shows relations to the processes of acclimatization. Presently available data suggest the end of functional adaptation and adjustment to be within the third week. There was a conspicuous large number of cases of prolongation of the acclimatization period needed by persons from the Werra Valley. *Subject Headings:* **1. Acclimatization 2. Seaside resorts 3. Heiligendamm, Germany.**—*Author's abstract.*

12.10–108 551.586:615.834

Schirgel, Lothar (*Heiligendamm, Germany*), **Zur Objektivierung des Gesamtkureffektes im Seeheilbad mit dem Leistungsprüfgerät nach Professor Böhlau.** [Objective evaluation of the total results of a seaside resort treatment using Prof. Böhlau's efficiency testing apparatus.] *Zeitschrift für Meteorologie*, Berlin, 13(1/6):91–92, Jan./June **1959.** German and English summaries, p. 91. **DWB, DLC**—Attention is drawn to particular difficulties, arising from several physiological and therapeutic effects, and the integration of them as to the result of the treatment, are observed and recorded. It is desired to achieve an optimum and comprehensive biological efficiency level, representing the efficiency reserve. Practical work at health resorts has necessarily to be confined to partial results and to the examination of the efficiency of functional complexes. Circulation and respiration probably offer the best means to approach the a/m targets. Hence, testing pulmonary functions by determining the amount of gas exchange during a particular physical effort and during the recreational period lead to certain conclusions as to the efficiency of the lungs and circulation, i.e., of two of the most important fundamental functions pertinent to the total efficiency. An apparatus developed at the Leipzig University Medical Clinic under the direction of BÖHLAU, and manufactured by VEB Junkalor, was used. Present results suggest that this equipment could be improved for objective physiological and therapeutic effects and yield data as to the results achieved by a cure, when ventilation, circulation and heat balance are recorded by such a six-fold recorder simultaneously. *Subject Headings:* **1. Seaside resorts 2. Climatotherapy 3. Heiligendamm, Germany.**—*Author's abstract.*

12.10–109 551.586:615.834

Schultze, Ernst-Günter (*Wyk auf Föhr*), **Über die Objektivierung der Kurergebnisse an der See.** [Objective evaluation of the results of a seashore health resort treatment.] *Zeitschrift für Meteorologie*, Berlin, 13(1/6):88–91, Jan./June **1959.** 5 figs., 8 refs. German and English summaries p. 88. **DWB, DLC**—After a short survey on the conventional methods of objectively evaluating the results of treatment on applying thalassotherapy, and after a critical review of these methods, it is suggested that one should regard a change of climatic environments as stimulating the vegetative system of nerves, i.e., the hormonal and circulation system. Some examples of measurable physiological processes, e.g., data concerning changes within the hormonal system investigations on the circulation system follow, permitting certain conclusions as to the reaction of the body during the cure. Finally, the author, by utilizing the aforementioned results, suggests the way how to make climatic cures more effective. *Subject Headings:* **1. Seaside resorts 2. Climatotherapy.**—*Author's abstract.*

12.10–110 551.586:616

Undt, W. (*Z. F. Met. und Geodynamik, Vienna*), **Diskussionsbeitrag zur Grundlagenforschung und zur praktischen Arbeitsmethodik der Medizin-Meteorologie.** [Discussion on basic research and practical working methods in medical meteorology.] *Zeitschrift für Meteorologie*, Berlin, 13(1/6):14–17, Jan./June **1959.** 16 refs. German and English summaries p. 14. **DWB, DLC**—Starting from the present opinions on the nature of meteorotropy, which still requires a large-scale experimental check, the author tries to outline the prerequisites for the analysis of meteorological and biological conditions as occur particularly in a health resort. A possible way is shown using cases of seasonal diseases and recently developed methods mentioned in relevant scientific papers. Furthermore, it is submitted for discussion to scrutinize the statistical data from medical and meteorological points of view. This could, as shown by

some real cases, be made a basis for up-to-date medical statistics to be utilized for basic research. Likewise, the necessity is emphasized of an extended meteorological measuring program for medicine-meteorological purposes. *Subject Headings:* **1. Medical meteorology 2. Climatotherapy.**—*Author's abstract.*

12.10–111 551.586:613.11:612.1

Halhuber, M. J.; Hierholzer, G.; Jungmann, H. et al., **Ueber das Verhalten der Pulsfrequenz wahrend der Hochgebirgsanpassung.** [Behavior of pulse rate during acclimatization in high mountains.] *International Journal of Bioclimatology and Biometeorology*, Leiden, Vol. 1 (Pt. 4, Human Bioclimatology), **1957.** 2 p. 3 figs.—The observations reported in this study are as follows: a moderate rise in mean resting pulse rate immediately after start of sojourn at high altitude in Obergurgl (2000 m above sea level) compared with rates in Innsbruck (600 m); gradual decrease in pulse rate in the first nine days of sojourn at high altitude when similar exertion took place (3000 m elevation) between days of measurement of pulse rates; marked reduction in pulse rate after a 2½ day ski run with the night spent at 3000 m elevation; gradual similar increase in pulse rate in the course of the third week of sojourn at high altitude; extensive and marked cradycardis in all controls after return to Innsbruck; the pulse behavior is similar in the case of O_2 lack and standing at rest; distinct increase in the amplitude of individual stress values with reference to those at the beginning of the high altitude stress values and those during the first two weeks of the high altitude sojourn. *Subject Headings:* **1. High altitude acclimatization 2. Pulse rate. I. Krauss, I.**—*I.L.D.*

12.10–112 551.586:615.834

Lühr, Karl and Wagner, Heinrich (*Bad Elster*), **Wirkung von Wetter und Klima auf den Kurpatienten in Bad Elster.** [Effect of weather and climate on health resort patients in Bad Elster.] *Annalen der Meteorologie, Medizin- Meteorologische Hefte*, No. 13:13–19, **1958**, 17 figs. **DWB**—The response of the organism to weather influences in health resorts is investigated by establishing an objective physiological response to the resort environment. This is attained by an average of collective body temperatures recorded at a definite time each day over the duration of a cure period. Such a curve shows an initial reaction on the fifth day of cure (temperature fall), a more prominent reaction during the 19–27 days and an equilibrium on the thirtieth day. The subjective state of the patient corresponds to this curve; an initial state of discomfort is transformed around the eighteenth day into a gradual feeling of well-being. Between the 5th and 10th resort day and principal reaction from the 17th day weather processes with great biotropic effects are very dangerous. The principal reaction was developed on the basis of mortality statistics (1955–1956) which show an increase in frequency between the 21st and 25th resort day, the same parasympathic phase during which the cure reaction of the patient subsides. Also blood pressure shows a variation with the cure period similar to that of body temperatures. Graphs showing the body temperature variations in a cure period, annual variations of body temperature and blood pressure, etc. are presented. *Subject Headings:* **1. Weather effects on health resort patients 2. Health resorts 3. Bad Elster, Germany.**—*I.L.D.*

B6. RADIOACTIVITY

See also: **Nuclear explosions** (India Defence Sci. Org.), 12.10–20; **Radioact. and meteorol. cond., Elbrus region** (Amineva), 12.10–294.

12.10–113 551.509.329:551.510.72

Bailey, R. E.; Cannon, W.; Cassano, A. J. et al., **Fallout predictor.** Ford Instrument Co., Long Island, N. Y., Contract DA-36-039-sc-78185, Quarterly Report No. 6, Oct. 1–Dec. 31, 1959, issued Jan. 15, **1960.** 81 p. 15 figs., 7 tables, 15 refs., numerous eqs. (For Reports 2 and 3, *see* 11.6–245, June 1960, *Met. Abs.*) **DWB** (M051) F711fa)—An attempt is made to design an improved fallout predictor. Summary cloud photography data that has recently become available is examined and analyzed. Plots of mushroom diameter and vertical thickness as a function of weapon yield are constructed from this empirical data and compared with developed corresponding mathematical expressions. A proposed method of calculatin

he horizontal displacement of a rising cloud is presented. This method is derived using mpirical data to correlate the per cent of the stabilized height to the time elapsed after the urst. An explicit expression describing the Reynolds Number, R_i as a function of the product f the drag coefficient, C_d, and the square of the Reynolds Number, $R=f(CdR^2)^d$, is derived om empirical data relating R and Cd. An analysis is made of the effect of errors in the input ata on the output fallout patterns. The probable error of the wafer landing position, in rms of the percentage of the mean distance from ground zero, is the error criteria used. The arameters considered are: 1) wind variability; 2) cloud height; 3) vertical winds; 4) observa- onal errors of wind, temperature, pressure, and density. The specified outputs of the pre- ictor are discussed. Flow charts are presented describing the determination of the output id intersection points covered by a wafer and the process of updating the information stored t these grid points. Flow charts also have been developed which describe the sequence of perations to determine (1) the output grid intersections covered by a wafer, (2) update nformations stored at these grid points and (3) process the grid-stored information at the pecific output times. The error analysis conducted on the input data parameters, based n a ten-year improvement in weather observation and forecasting accuracy, showed that the ass significant errors in a fallout prediction are due to (a) wind deviations with time and b) stabilized cloud height uncertainties. The net probable error of a wafer landing position or two average cases was computed to be approximately 15% of the mean distance from ground ero. Thus, the processing of data to a precision of 5% will cause an error of only 1% in the nding position of an average wafer. *Subject Heading:* **1. Radioactive fallout probability recasting.**—*Authors' abstract and O.T.*

12.10–114 623.451.519:551.510.53:551.510.72:551.574.1

Boclet, D.; Jehanno, C.; Labeyrie, J. et al., **Utilisation d'un missile expérimental pour l'évaluation des concentration en aérosols radioactifs artificiels en haute altitude.** [Utilization of an experimental missile for the evaluation of the concentration in artificial radioactive aerosols at high altitude.] *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 215–220. 4 figs., ref. French, English and Russian summaries p. 215. **DWB** (523.1 I61sp). Also issued as: *U. S. Naval Research Lab., NRL Report* 5528, Aug. 15, **1960.** 17 p. 13 figs., 3 tables, 11 refs. **DWB** (M(055) U586r)—By means of measurements with a Geiger counter on Jan. 27, 1959 at an altitude reaching 65 km approximately, and following comparison with similar measurements made by GANGNES, JENKINS and VAN ALLEN in 1949 at the same geomagnetic latitude (41°N), it is concluded that radioactive aerosols above southern France tropopause had a concentration less than 100×10^{-12} Curie/m³ at that time. The missile used for this purpose and its performance are described in this paper. *Subject Headings:* **1. Radioactive aerosols 2. Missile determination of radioactive aerosol concentration. I. Le Boiteux, H.**—*Authors' abstract.*

12.10–115 551.510.721

Lockhart, L. B., Jr.; Patterson, R. L., Jr.; Saunders, A. W., Jr. et al. (*all, U. S. Naval Res. Lab., Wash., D. C.*), **Fission product radioactivity in the air along the 80th meridian (west) during 1959.** *Journal of Geophysical Research,* Wash., D. C., 65(12):3987–3997, Dec. **1960.** figs., 2 tables, 12 refs. **DLC.** Also issued as *U. S. Naval Research Laboratory, Report,* 28, Aug. 15, **1960.** 17 p. 13 figs., 3 tables, 11 refs. **DWB** (M(055) U586r)—The program measurement of the fission product concentration in the air at ground level at sites along e 80th meridian was continued during 1959. During this period no fresh nuclear debris was ded to the atmosphere, with the result that seasonal changes in deposition rates from strato- heric sources were more apparent. The radioactivity levels in the Northern Hemisphere ached the highest average during the operation of this network (started May 1956) in the ring of 1959. Radiochemical analyses indicated that the bulk of this debris was introduced to the stratosphere during the Oct. 1958 series of high-yield nuclear tests held in the Arctic gion of the Soviet Union. Evidence has been obtained of a definite seasonal dependence r stratospheric deposition, with debris in the arctic stratosphere being more strongly influ- ced than that in the tropic stratosphere. No such definite conclusions can be made from dioactivity collected in the Southern Hemisphere. Evidence is presented that mixing of the atospheric sources in the Northern Hemisphere was not complete by the end of 1959; and

though radioactivity levels in the two Hemispheres were approaching unity in late 1959, th isotopic composition of the collections indicated that the average age of the debris in th Southern Hemisphere was much greater. *Subject Headings:* **1. Artificial radioactivity 2. Ra dioactivity levels 3. Southern Hemisphere 4. Northern Hemisphere. I. Black, R. W.**— *Authors' abstract.*

12.10–116 551.510.721(99

Lockhart, Luther B., Jr. (*U. S. Naval Res. Lab., Wash., D. C.*), **Atmospheric radioactivit in South America and Antarctica.** *Journal of Geophysical Research*, Wash., D. C., 65(12):3999 3005, Dec. **1960.** 4 figs., 3 tables, 10 refs. **DLC.** Also issued as: *U. S. Naval Research Lab NRL Report* 5526, Aug. 15, **1960.** 9 p. 4 figs., 3 tables, 8 refs. **DWB** (M(055) U586r)— Information on the concentration of the major natural radioactive species and of gross-fissio product activity in the ground-level air at several sites in South America and Antarctica reported. These data have been obtained through a cooperative program between the U. Naval Research Laboratory and groups at the various collecting sites utilizing equipme designed and supplied by NRL. Fission products have been found to be minor contributo to the radioactivity of the air in the southern hemisphere, except that in Antarctica (ar presumably at some island sites) it assumes relatively more importance because of the lo concentrations of natural activity there. Seasonal variations in one or more of the radioacti components of the atmosphere are evident at each of the various sites. *Subject Heading* **1. Atmospheric radioactivity 2. Artificial radioactivity 3. South America 4. Antarctic** —*Author's abstract.*

12.10–117 551.510.41:546.26 550.93:539.16:546.

†Lorthioir, M., **La mesure des ages par le radiocarbone.** [Radiocarbon dating.] *Revu M.B.L.E.*, Brussels, 3(3):157–181, Aug. **1960.** 11 figs., table, 38 refs., eqs. **DLC**—The auth briefly reviews how radiocarbon forms in the atmosphere and what are its principal physic characteristics, and the principles of the dating technique by means of C^{14} and how it has be verified. The cosmic rays produce in the atmosphere a radioactive isotope of carbon, t carbon 14, which produces a low energy beta-radiation. The carbon atoms thus form combine after some minutes with the oxygen of the air to produce carbon dioxide. In th state the C^{14} is assimilable by the plants and through them by the animals, just as are t stable isotopes C^{12} and C^{13}. When the plant or the animal leaves the cycle of the atmosphe carbon, the radioactivity of C^{14} decreases the quantity of this element in the organism whi had absorbed it. This decrease manifests itself through that of the activity itself which reduced by one half every 5568 yrs. If the specific activity of the carbon extracted from geological or archaeological sample is compared with the specific activity of recent natu carbon, the age of the sample can be inferred. Then the author describes the various types detectors used for the measurement of radiocarbon and compares their performances to da the samples. He also gives a critical examination of the precision of the method and t different sources of errors. Finally, by means of some typical examples, the author sho the scientific as well as the historical interest of the age-determination of geological and archa logical samples. *Subject Headings:* **1. Radiocarbon in the atmosphere 2. Radiocarbon co centration in geologic samples 3. Radiocarbon dating.**—*A. V.*

12.10–118 551.510.721:551.510.42:662.2:53

Jurkiewicz, L. and Massalska, M., **Radioactive air pollution in Cracow resulting fr nuclear explosions.** *Acta Geophysica Polonica*, Warsaw, 8(1):61–67, **1960.** tables, 2 re **DWB, DLC**—Measurements of radioactive contamination of atmospheric precipitation Cracow (from nuclear explosions)—total fall-out and dust suspended particles were contin in 1958 and 59 using methods of collection and measurements described by us in 1958. Twen one tables contain the results. Evaluation of the standard activity of KCl was based figures given by Endt and Braams (1957). It has been assumed that in regard to b radiation 1 gr of KCl is equivalent to $3.84–10^{-10}$ Curie. *Subject Headings:* **1. Atmosphe pollution from radioactivity 2. Nuclear explosion effects 3. Radioactive fallout data 4. B radiation 5. Cracow, Poland.**—*E.S.*

12.10–119 551.510.721

Machta, Lester, **Meteorology and radioactive fallout.** *World Meteorological Organization, WMO Bulletin*, 9(2):64–70, April **1960.** 2 figs., 6 refs. **DWB**—Describes the worldwide problem of atomic fallout. Two elements of radioactive fallout, Sr^{90} and Cs^{137}, have received special attention. Due to the fact that most of the winds over the globe are zonal, tropospheric debris is carried around the earth in the same latitude as the test site. At present the stratosphere is the only atmospheric reservoir of bomb debris. The fallout pattern shows a greater deposition over the Northern than over the Southern Hemisphere. There are seasonal variations in fallout rate in the temperate zone with a maximum in spring and a minimum in autumn. *Subject Heading:* **1. Radioactive fallout distribution.**—*A.H.K.*

12.10–120 551.510.721

†Martell, E. A. (*G.R.D.-AFCRC-Bedford, Mass.*), **Atmospheric aspects of strontium-90 fallout.** *Science*, Wash., D. C., 129(3357):1197–1206, May 1, **1959.** 6 figs., 4 tables, 32 refs. **DLC**—A review of present knowledge of Sr^{90} production, size distribution, fallout patterns, concentration in surface air at various places, deposition in rain and snow and cumulation in soil, age of debris, distribution over surface of earth, seasonal variations in Northern Hemisphere and in New Zealand, dependence of seasonal variation and total amount in soil on rainfall, stratospheric storage time (5–10 yrs), effect of Soviet tests on fallout observed in north temperate latitudes, effect of jet stream, even distribution over both hemispheres of fallout from stratospheric injection in low latitudes are some of the subjects treated and illustrated by tables and graphs. *Subject Headings:* **1. Strontium^{90} fallout 2. Strontium^{90} distribution.** —*M.R.*

12.10–121 551.510.721

Miyake, Y. and Saruhashi, K. (*both, Met. Res. Institute*), **The world-wide strontium 90 deposition during the period from 1951 to the fall of 1955.** *Papers in Meteorology and Geophysics*, Tokyo, 8(3):241–244, Oct. **1957.** 2 figs., 2 tables, 2 refs. Japanese summary p. 244. **DWB**—The distribution map of the cumulative Sr^{90} deposition on the whole earth was based on the data of Eisenbud and Harley (1956) and those submitted to the Third Conference of the UN Scientific Committee on the Effect of Atomic Radiation, held in March 1957. It is seen that most of the radioactive fallout derived from the Bikini area was transported W-NW-ward; on the other hand, the fallout originating from central Asia and Nevada flowed eastward. Table 1 (deposition as of Sept. 1955) shows the amount of radiostrontium in megacurie accumulated in both hemispheres and other eastern and western parts. The total amount on the earth reached 0.7 megacurie and about 81% and 57% of the total was concentrated respectively in the Northern Hemisphere and its eastern half. The mean value of Sr^{90} was 3.5 mc/mi^2 tabulated in different parts of the earth. A remarkable meridional distribution in the Northern Hemisphere is summarized in Figs. 2a and 2b. *Subject Headings:* **1. Strontium^{90} deposition 2. Atomic radiation effects conference 3. Northern Hemisphere.**—*K.C.*

12.10–122 551.510.535:662.2:539.1:551.594.5

†Newman, Philip (*Air Force Res. Center, L. G. Hanscom Field, Bedford, Mass.*), **Optical, electromagnetic, and satellite observations of high-altitude nuclear detonations, Pt. 1.** *Journal of Geophysical Research*, Wash., D. C., 64(8):923–932, Aug. **1959.** 12 figs., table, 22 refs. Also: Peterson, Allen M. (*Stanford U., Res. Inst., Stanford, Calif.*), **Pt. 2.** *Ibid.*, p. 933–938. 5 figs., table, 10 refs. **DLC. Pt. 1–2** issued in *Canada. Defence Research Telecommunications Establishment, Publication*, No. 1025, March **1960.** p. 103–118. 17 figs., table, 32 refs. **DWB** (M21 S989pro)—After each of the high-altitude detonations in the Argus experiment, visual auroras were observed in the detonation area. After the third event an aurora was observed in the conjugate area. After the second and third events, signals attributed to hydromagnetic waves were detected in the conjugate region; these signals had a periodicity of about 1 cycle per sec. The maximum change in the magnetic field was about 1 gamma. If propagated along the magnetic line of force the velocity was about 2000 km/sec. Sporadic E was observed after the third event in the conjugate area. Comparative records of the 5577 A and 3914 A lines were obtained in the detonation area. The radio effects of the Argus detonations were measured using (1) 30-Mc radars designed to obtain echoes from the aurora or from

the earth's surface mirrored in an enhanced ionospheric layer, (2) VLF receivers for monitoring distant transmitters or atmospheric noise sources in search of changes in signal strength, (3) riometers for recording cosmic noise absorption of VHF shot-created noise at 30, 60 and 120 Mc. Results included (1) auroral echoes in the vicinity of the launch point after all three shots, and near the conjugate points after the first and third shot, (2) sudden depressions of 6 to 12 db of the signal from England (19.6 kc) at Madrid and the Azores, (3) no ionospheric absorption at the conjugate location. *Subject Headings:* **1. Nuclear explosion effects on ionosphere 2. Artificial auroras 3. High altitude nuclear explosions 4. Argus Experiment.**—*Author's abstracts.* Ⓢ

B7. INDUSTRY

12.10–123 551.521.1:620.91(493)

Marchal, Anatole F., **Le Soleil et son énergie.** [The sun and its energy.] *Industrie*, Brussels, 14(4):231–238, April **1960.** fig., 9 photos.—Examination of the various methods of utilizing solar energy i.e., solar engines, solar batteries, solar furnaces, etc. Fundamental data relating to photosphere, chromosphere, corona, solar activity, etc. are discussed. Without entering into too scientific considerations, the author clearly lays out the solar activity and the various processes explaining the enormous energy released by the sun. The last part is devoted to solar energy utilization and the possibilities of taking advantage of this natural energy in Belgium. Observations made by the Radiation Service of the Royal Meteorological Institute make it possible to assess the efficiency degree of solar exploration in Belgium. Some photographs illustrate this excellent article and especially noteworthy is a photograph giving a wonderful view of a fraction of the photosphere with granules and spots. This photograph was taken from a stratospheric balloon at 27,000 m altitude on Aug. 19, 1959 and retransmitted by television (Project Stratoscope). *Subject Headings:* **1. Solar energy 2. Solar energy availability 3. Solar engines 4. Solar energy utilization in Belgium 5. Belgium.**—*A.V.*

12.10–124 551.586:72

†Page, J. K. (*Univ. of Liverpool*), **Some aspects of architectural bioclimatology.** *International Journal of Bioclimatology and Biometeorology*, Leiden, Netherlands, Vol. 2 (Pt. 4), **1958.** 29 p. 9 figs., 8 tables, 137 refs., 3 eqs. **DWB**—A review of available knowledge on the effects of climate and weather on buildings and the environment inside them. The discussion includes the following: organization problems in the cooperation between meteorologists, engineers, architects, and builders; basic operations in the sphere of building and their relation to climatic aspects; climatology and town planning; building design and desirable environments; thermal aspects of human comfort; visual, olfactory and acoustical aspects of human comfort; climatological factors influencing thermal conditions in buildings including heat exchange between the indoor and outdoor environment and the design considerations; design considerations for the heating and cooling plant; ventilation and air movement in buildings; the stack effect and pressure on buildings; wind flow round and through buildings; climatological conditions affecting daylighting design; effects of precipitation on buildings and building materials, including effects on rainfall, flooding, soil erosion, and variations in the moisture content of the ground; damp penetration, surface erosion of building materials; thermal shock; modification of thermal properties of walls and roofs due to absorbed moisture; snow and hail effects; climatic risks affecting the safety of the occupants and the stability of the structure; and climate and the durability of building materials. An appendix contains a mathematical treatment of heat conduction through walls; diagrams showing the daily flux of direct short wave radiation from the sun falling on vertical surfaces at different times of the year at lat. 40°17′S; a radiation overlay for estimating direct short wave radiation gains in vertical surfaces from a stereographic projection of the sun's path for any given latitude, etc., are presented. *Subject Headings:* **1. Architectural climatology 2. Bioclimatology and architecture.**—*I.L.D.*

12.10–125 662.2:621.642.02:550.340.65

Wéry, A., **Projet d'explosions en Belgique.** [Explosion project in Belgium.] *Belgium Observatoire Royal, Communications*, No. 145, **1959.** 19 p. 11 refs. (*Série Géophysique*

No. 48.) **DLC**—With a view to creating underground gas storage, the Gas Company of the Liège region plans large explosions (of the order of 30 tons of T.N.T.) within gas-tight clay. This program has been designed with the collaboration of the Geological Service and of the Seismological Service of the Observatory of Belgium. Regarding the explosions, the following points were particularly discussed from a technical standpoint: choice of the site, depth of the compression chamber, combustion chambers and explosive charges, friability sphere. The author recalls and describes the great explosions during the 1914–18 war, and discusses the principle of explosions, classification and comments on the results of the explosions in Nevada and Uzbekistan and also some other important explosions, the charges of which do not appear to have been geometrically concentrated. Among the seismological observations included in the program measurements of shock wave intensity, pressure exerted in the soils, temperature of the rocks adjoining the focus should be mentioned. The study of local metamorphism and other geological investigations also appear in the program. *Subject Headings:* **1. Gas storage 2. Underground reservoirs 3. Explosion program 4. Seismic observations 5. Geologic observations 6. Liège, Belgium.**—*A. V.*

B8. MILITARY SCIENCE

12.10–126 551.506.7:551.508.822

Lenhard, Robert W., Jr. (*Air Weather Serv., Andrews Air Force Base, Md.*), **Meteorological accuracies in missile testing.** *Journal of Meteorology*, Boston, 16(4):447–453, Aug. 1959. 7 tables, 14 refs. **DWB, DLC**—The accuracy with which meteorological elements can be measured by currently operational radiosonde equipment is examined and representative error values calculated. A method of analyzing cross-sections for missile test ranges is described. The average of two soundings is plotted at the mid-point between them and the soundings reconstructed by use of the geostrophic extrapolation. The gain in accuracy from averaging is offset by the geostrophic approximation. These opposing effects are shown by error values calculated for a fixed range distance and by distance values over which the analysis is useful. *Subject Headings:* **1. Observational errors 2. Radiosonde instruments 3. Upper air observation techniques.**—*Author's abstract.*

12.10–127 551.524.4:551.554:551.507.362.2

Lifson, Melvin (*Chance Vought Aircraft, Inc.*), **Some effects of wind and temperature gradients on the design of missile flight control systems.** *Aero Space Engineering*, N. Y., 17(9):59–62, Sept. **1958.** 7 figs., ref., 10 eqs. **DLC**—This piece of research work is on the evaluation of the temperature and wind gradient effects on the climb parameters, the performance of an hypothetical aerodynamic missile with a Mach Number 3.0 controller in the standard stratosphere and in an atmosphere with several temperature gradients. Wind gradient causes the missile to overshoot the standard day peak altitude by approximately 17,000 ft. A few other effects are discussed and illustrated in charts. As the Mach number increases it has been noted that the effects of atmospheric temperature and wind become more pronounced. *Subject Headings:* **1. Temperature-wind gradient effects on missiles 2. Missile flight.**—*N.N.*

12.10–128 625:631.4

Molineux, Carlton E., **Remote determination of soil trafficability by the aerial penetrometer.** *U. S. Air Force. Cambridge Research Center, Air Force Surveys in Geophysics*, No. 77, Oct. **1955.** 46 p. 25 figs. (incl. photos), 18 refs. **DWB**—Basic soil trafficability concepts and soil properties are described, together with standard engineering methods for determining trafficability, including the manual cone penetrometer. The aerial penetrometer for trafficability determination from aircraft is described in detail, with procedures for use, limitations and safety factors given. Information on soil strength requirements for various combinations of aircraft loads and tire pressures is given, with conversion factors for aerial penetrometer use of standard vehicle mobility engineering data. Other applications of the aerial penetrometer for investigation of trafficability of snow and ice covered surfaces are outlined. *Subject Headings:* **1. Soil trafficability determination 2. Aerial penetrometer measurements.**—*Author's abstract.*

12.10–129 551.552:551.557.2:531.5:623.

Texas. Univ. Balcones Research Center, **Eighteenth semi-annual report, June 20 Dec. 20, 1958.** issued **1958.** 112 p. figs., photos.—Among the many projects reported i this volume are investigations in exterior ballistics (p. 42–44), especially crosswind ballistics studies involving development of computational techniques to describe motions of munition fired or launched under crosswind conditions and the analysis of experimental trajectorie and study of air structure and winds on bombing accuracy. Then studies are being made i the Military Physics Research Laboratory. Reports published under contracts during calenda year 1958 are listed on p. 48–52. Many by JOSEPH B. OLIPHANT are pertinent under Contract AF 08(603)-4396 and 4536. *Subject Heading:* **1. Crosswind ballistics studies.**—*M.R.*

12.10–130 551.58:623 551.581:551.501.

*U. S. Assistant Secretary of Defense (Supply and Logistics), **Climatic extremes for militar equipment.** Wash., D. C., U. S. Govt. Print. Off., Aug. 2, **1957.** 44 p. 3 figs., 6 tables (MIL-STD-210A, superseding MIL-STD-219 of June 1, 1953.) **DWB** (M:355 U581cL)— Magnitudes of various environmental factors (temperature, humidity, precipitation, wind pressure, blowing sand, dust and snow, etc.), to be expected in areas with extreme climati conditions (Arctic winter, moist tropics, hot desert, shipboard) and at various altitudes ar presented in graphical and tabular forms. *Subject Headings:* **1. Climatic extremes 2. Militar climatology.**—*G.T.*

B9. RADIO METEOROLOGY

See also: **High freq. radio black-outs** (Collins et al.), 12.10–149; **Orig. and decay of noise storms on solar disk** (Maltby), 12.10–150; **Solar noise storms and sunspot parameters** (Maltby, Steen), 12.10–151; **Faraday effect rel. to the ionos.** (Argence et al.), 12.10–169; **Determ. of ionos. electron content** (Blackband), 12.10–170; **Ultrashort waves and commun. with met. mountain stations, Yugoslavia** (Metzger), 12.10–239.

12.10–131 551.515.8:551.510.62:621.396.

†Bean, B. R.; Horn, J. C. and Riggs, L. P. (*all, Natl. Bur. of Standards, Boulder, Colo.*) **Refraction of radio waves at low angles within various air masses.** *Journal of Geophysica Research*, Wash., D. C., 65(4):1183–1187, April **1960.** 5 figs., table, 23 refs., 5 eqs. **DLC**— The refractive index structure and bending of radio rays within air masses of nonexponenti refractive index height structure is treated in terms of the value expected in an average a mosphere of exponential form. It is demonstrated that refraction differences within air masse arise from departures of refractive index structure from the normal exponential decrease wit height. The effect upon radio ray refraction of these departures from the normal exponenti refractive index structure is most pronounced for small initial elevation angles of the radi ray. *Subject Headings:* **1. Radio waves 2. Refraction of radio waves.**—*Authors' abstract.*

12.10–132 551.510.62:621.396

Bean, B. R.; Thayer, G. D. and Cahoon, B. A., **Methods of predicting the atmospher bending of radio rays.** *U. S. National Bureau of Standards, Journal of Research, Sec. D* 64(5):487–492, Sept./Oct. **1960.** 5 figs., 14 refs., 11 eqs. **DWB, DLC**—Three methods f predicting the bending of radio rays when the refractive index profile above the surface layer unknown have been developed recently by the authors. These methods are a statistical tec nique for refraction at high initial elevation angles, estimation of bending from an exponenti model of atmospheric refractive index, and a modification of the exponential model to accou for the heavily weighted effects of anomalous initial refractive index gradients at small initi elevation angles. Each model is dependent upon the value of the refractive index at grou level or, in the case of superrefraction, the additional knowledge of the refractive index gradie next to the earth's surface. Each method works best in a particular range of initial elevatio angles or meteorological conditions. The height and angular ranges of application of ea method are checked by comparison with values obtained from 77 diverse refractive ind profiles representative of wide climatic variation. It is found that the use of the best of t three methods will always result in a prediction of the total atmospheric bending within 10 for initial elevation angles from zero to 10 milliradians and to within 4% for initial elevatio

ngles greater than 17 milliradians (~1 def). *Subject Headings:* **1. Refractive index profiles 2. Radio wave propagation forecasting.**—*Authors' abstract.*

12.10–133 551.510.62:621.396.1

†Bolgiano, Ralph, Jr. (*Cornell Univ.*), **A theory of wavelength dependence in ultrahigh frequency transhorizon propagation based on meteorological considerations.** *U. S. National Bureau of Standards, Journal of Research, Sec. D*, 64(3):231–237, May/June **1960.** 6 figs., able, 24 refs., 13 eqs. **DWB, DLC**—Recent radio data indicate that the wave length dependence of ultrahigh frequency transhorizon propagation varies widely in time. This is in contradiction with theoretical explanations previously set forth. Each attempt to account for the underlying effects of everpresent atmospheric motions has, in the past, pointed toward a unique form of the dependence. Extensive discussions have resulted as to the validity and relative merits of the various forms, but at no time has a variable wave length dependence been proposed. Since scatter propagation theory has predicted so satisfactorily the broad aspects of the radio signals, it is retained as the basis for further analysis. A new model is developed for the structure of refractive index fluctuations induced by turbulence. Grounded on a theory of homogeneous turbulence in a stably stratified atmosphere, which has been developed concurrently by the author, this new model provides an explanation for the observed distribution of wave length dependence. It suggests that at times when the dynamic stability of the air within the scattering volume is neutral the received power should be nearly independent of radio wave length. On the other hand, when the atmosphere is dynamically stable the signal strength should be proportional to the square, or higher power, of the wave length. These predictions have been tested by comparing the results of a scaled-frequency experiment with simultaneous meteorological data gathered along the path. Richardson's number for the 0- to 3-kilometer layer, within which the principal scattering volume lies, has been employed as an index of dynamic stability, though it falls short of ideal in some respects. The 0.8 value of correlation found between Richardson's number and the wave length dependence is highly suggestive that a relation of the nature predicted does, in fact, exist. *Subject Headings:* **1. Radio wave propagation beyond the horizon 2. Wave lengths 3. UHF radio wave propagation.**—*Author's abstract.*

12.10–134 551.508.99:551.510.62

Deam, A. P., **An expendable atmospheric radio refractometer.** Texas. Univ. Electrical Engineering Research Lab., Contract Nonr 375(08), Report No. 108, May 15, **1959.** 9 p. plus appendices, 16 figs., 3 refs., 24 eqs. **DWB** (M84 T355r)—This report describes a device which has been designed to measure atmospheric index of refraction profiles at a frequency of 403 mc/s. It is a prototype instrument and should be capable of ejection from an aircraft as well as elevation with a balloon. Transmitted frequency is received at a receiver whose recorded output is relative radio index of refraction. This instrument has been successfully tested in a balloon flight to elevations of the order of 60,000 ft. *Subject Heading:* **1. Air-borne refractometers.**—*Author's abstract.*

12.10–135 551.511:551.510.52:551.510.62

†Eckart, Gottfried, **Statische Beschreibung der dielektrischen Turbulenz in der Troposphäre. Erster teil einer Theorie der Streuung elektrischer Wellen in Turbulenter Atmosphäre.** [Statistical presentation of dielectric turbulence in the troposphere. Pt. 1 of a Theory of the scattering of electric waves in the turbulent atmosphere.] *Akademie der Wissenschaften, Munich. Math.-Naturwiss. Klasse, Abhandlungen, New Ser.*, No. 74, **1955.** 44 p. fig., 26 refs., 112 eqs. **Pt. 2, Über die Streuung elektrischer Wellen an Zonen dielektrischer Turbulenz.** [Scattering of electric waves at zones of dielectric turbulence.] *Ibid.*, No. 76, **1956.** 36 p. 7 refs., 107 eqs. **Pt. 3, Die Analyse der Störungen der Dielektrizitätskonstanten dielektrisch turbulenter Zonen mittels Streufelbeobachtungen.** [Analysis of disturbances of the dielectric constant of dielectric turbulent zones by means of observations of the field of scattering.] *Ibid.*, No. 77, **1956.** 18 p. 9 refs., 44 eqs. **DWB**—Statistical theory of turbulence is developed and presented in detail and applied to the propagation (or scattering) of ultrahigh frequency waves in the troposphere. The first part of this series of 3 papers covers in 7 chapters: 1) the definition of dielectric turbulence; 2) mathematical definition

in form of Fourier series in space and time, and in the form of a Fourier integral; 3) the variatio of the dielectric constant (DK) in space and time as a random process; 4) the relation betwee the frequency of function of the processes and that of the Fourier coefficients; 5) the representa tion of the moments and solution of the moment problem by means of Mellin (two-side Laplace) transformations; 6) homogeneous stationary space-time intervals; 7) criteria fo introduction of homogeneous stationary intervals and related problems. Pt. 2 and 3 continu with the theoretical or statistical treatment and its application to radar scattering or fadin under the assumption that empirically derived data from attenuation of short waves in turbulent atmosphere are not comprehensive enough to give a true picture of the quantitativ effects of turbulent media on the radiation passing through such a medium. *Subject Heading* **1. Tropospheric scattering theory 2. Dielectric turbulence zones 3. Radio fading 4. UH scattering.**—*M.R.*

12.10–136 551.510.62(26

Holden, D. B.; Gossard, E. E. and Hopkins, R. U. F., **Radio meteorology and climatolog of the eastern North Pacific.** *U. S. Navy Electronics Laboratory, San Diego, Calif., Report* 96 April 25, **1960.** 33 p. 14 figs., 4 charts (fold.), 13 refs. **DWB** (M(055) U575r)—The radi meteorology and climatology of the northeastern Pacific are analyzed in terms of the probabili of greatly extended propagation ranges at very high frequency. Seasonal charts of frequen of occurrence of elevated trapping layers are presented for the north Pacific. The first part this report deals with the radio meteorology of the Pacific west coast and in particular, with th intense elevated refractive layers often found in the area. Temperature, humidity, an refractive index cross-sections between the west coast and Hawaii are presented for vario characteristic weather regimes. Also cross-sections of radio field strength and refractive ind from data obtained from aircraft by the Navy Electronics Laboratory are shown. Some of th flights were made in conjunction with the 1944 stratus investigation project of the Depar of Meteorology of the Univ. of California at Los Angeles, and on the days of the flights go supplemental sounding data were available from a fairly dense network of radiosonde statio in southern California. For those days, synoptic and reasonably accurate contours of t inversion base were drawn. The latter part of this report presents information on the frequen of occurrence of the trade wind inversion and of "trapping" refractive layers over the nor Pacific and the altitudes at which they occur. *Subject Headings:* **1. Radio meteorolo 2. Trapping refractive index data 3. Refractive layers over the north Pacific 4. Radio fie strength cross-section 5. Southern California 6. Hawaii.**—*E.Z.S.*

12.10–137 551.510.62:621.39

Venkateswarlu, P. and Satyanarayana, R. (*both, Physics Dept. S. V. Univ., Tirupat*) **Propagation of ground waves across a land/sea boundary.** *Current Science*, Bangalo 28(6):239, June **1959.** table, 3 refs. **DWB, DLC**—Observations on the field strength ground waves of 447.9 m wave length from A.I.R. Calcutta station suggest that a recovery field strength as expected from MILLINGTON'S analysis (1949) is possible even at these wa lengths. Relative intensities determined theoretically and experimentally at widely separat stations in India are tabulated. The details regarding the extent of recovery and the fie strength expected at Tirupati on the basis of Millington's theory are being worked out. *Su ject Headings:* **1. Ground wave propagation 2. Calcutta, India.**—*E.Z.S.*

C. ASTRONOMY AND ASTROPHYSICS

C1. COSMOGONY—ASTRONOMY

12.10–138 523.4:523

Levin, B. Iu., **Razvitne planetnoĭ kosmogonii.** [Development of planetary cosmogon *Priroda*, Moscow, No. 10:19–26, Oct. **1959.** 2 figs., 7 foot-refs. **DLC**—In this survey of t development of the science, the author discusses the contributions of the leading representati of planetary cosmogony. It is pointed out that the contemporary ideas of the gradual form

tion of the atmosphere and hydrosphere by accumulation of gas and vapor generated from the Earth's interior are in perfect agreement with the cosmogonic inference on the cold accumulation of the earth and its subsequent warming up. *Subject Headings:* **1. Planetary cosmogony 2. Atmospheric formation 3. Hydrospheric formation.**—*A.M.P.* Ⓢ

12.10–139 550.36(09) 551.2(09)

†Levin, B. Iu. and Maeva, S. V., **O termicheskoĭ istorii Zemli.** [The thermal history of the earth.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 2:243–252, Feb. **1960.** 6 figs., table, 21 refs. Russian summary p. 243. **DLC.** Transl. into English in the corresponding number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The thermal history of the initial cold earth is calculated for a series of models of the earth differing in the mean content of radioactive elements, heat capacity of the earth's core and the role of radiational heat conductivity. The formation of the earth's core is considered as an active process that began 3×10^9 years ago. When the role of radiational thermal conductivity is considerable, the computed heat flux coincides with observations, when the content of radioactive elements is smaller than that assumed earlier. The comparisons of theoretical values of heat flux for sections of the earth with a continental and oceanic crust showed that the difference of fluxes is less than the differences in the thickness of the earth. This results from the fact that the flow proceeds not only from the crust but also from deeper layers. This conclusion agrees with the fact that observations do not reveal perceptible systematic differences of heat fluxes on continents and oceans. *Subject Headings:* **1. Radiational heat conductivity 2. Radiational thermal conductivity 3. Earth's thermal history 4. Heat flux.**—*Transl. of authors' abstract* (*I.L.D.*).

12.10–140 522.2

Minnaert, M. G. J., **De grootste teleskoop van Europa.** [The biggest telescope in Europe.] *Hemel en Dampkring*, The Hague, 58(12):281–284, Dec. **1960.** 2 figs. **DWB, DLC**—The description of a telescope, biggest in Europe, constructed and mounted at Tautenburg (German Dem. Rep.), 20 km North of Jena in the new Karl Schwarzschild Observatory. It is a combination of a telescope and a Schmidt camera. The plans were drawn by Hans Kienle in 1947 but it was constructed by the Carl Zeiss firm. The Schmidt camera has a 2 mr mirror, a focus distance of 4 mr and a f:3. This telescope is used for photometric and spectrographic work. The new telescope is at the disposal of foreign scientists and the Zeiss firm is constructing two other similar telescopes, one for the U.S.S.R. and another for Czechoslovakia. *Subject Headings:* **1. Astronomical observatories 2. Telescopes 3. Karl Schwarzschild Observatory, Tautenburg, Germany.**—*A.V.* Ⓢ

12.10–141 523.152

Pfau, W., **Die Entstehung der chemischen Elemente im Kosmos.** [Origin of chemical elements in the cosmic universe.] *Die Sterne*, Leipzig, 36(7/8):129–141, July/Aug. **1960.** 2 figs., 2 tables, 12 refs. **DLC**—The article shows the peculiarities of the observed frequency distribution of chemical elements in cosmic universe. A table of Suess and Urey after observations of the sun, planets and meteorites is attached. Cameron has recently improved this table on certain points. The most important characters of frequency distribution, shown in a graph, are: 1) light frequency of deuterium, lithium, beryllium and boron (B); 2) important frequency of ferrous elements; 3) a double maximum on atomic weights 80/90; 130/138 and 196/208. As a rule two theories are distinguished: the former puts the origin of elements in a pre-stellar stadium; the latter, worked out by E. M. Burbidge, G. R. Burbidge, Fowler and Hoyle, puts origin of elements in the star itself. The author describes completely the last theory. A table gives a comparison of the results of spectral quantitative analysis. The article ends by quoting the recent work of Cameron. *Subject Headings:* **1. Cosmic universe 2. Frequency distribution of chemical elements in cosmic universe.**—*A.V.* Ⓢ

12.10–142 525.75

Roach, F. E. and Megill, Lawrence R. (*both, Boulder Labs., Natl. Bur. of Standards*), **Integrated starlight over the sky.** *Astrophysical Journal*, Chicago, 133(1):228–242, Jan. **1961.** 8 figs., 9 tables, 8 refs., 6 eqs. **DWB, DLC**—Calculations are made of the total in-

tegrated starlight over the entire sky based on the star counts in Groningen Pub., No. 43 The results are given in both the photographic and the visual magnitude scales in tabular an graphical form. *Subject Heading:* **1. Integrated starlight calculations.**—*Authors' abstract.* Ⓢ

12.10–143 535.242:523.8

†Irwin, John B. (*Indiana Univ., Bloomington*), **The first 70,000.** (In: Beer, Arthur (*ed.*) **Vistas in Astronomy,** Vol. 3, pub. **1960.** p. 147–170. 3 figs., table, 43 refs.) **DWB** (520.8 B415v), **DLC** (QB3.B35)—A brief examination and discussion is given for the nine types o basic observational data which may be quickly obtained with telescopes of moderate size fo stars brighter than visual magnitude 8·5. It is concluded that for these 70,000 stars photo electric multicolor data and much more accurate proper motions are most urgently required Furthermore, existing photoelectric techniques should be applied to the determination of thei precise spectral and luminosity classes. The development of a photoelectric technique for th quick determination of radial velocities offers a special challenge and seems attainable. Th key role of the photoelectric cell in most of these types of observations strongly suggests th need for a new and specialized type of observatory; such an observatory is especially neede in the southern hemisphere. *Subject Headings:* **1. Astronomical observation data 2. Photo electric techniques.**—*Author's abstract.* Ⓢ

C2. SUN

See also: **The sun and its energy** (Marchal), 12.10–123; **Geomag. disturbances and active solar regions** (Dvoriashin), 12.10–193.

12.10–144 551.507.362.1:551.521.1

Purcell, J. D.; Packer, D. M. and Tousey, R. (*all, U. S. Naval Res. Lab., Wash., D. C.*) **The ultraviolet spectrum of the Sun.** *International Space Science Symposium, Nice, Ja* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 581–589. 2 figs 10 refs. French and Russian summaries p. 581. **DWB** (523.1 I61sp)—A spectrum of the su obtained on March 13, 1959, from an Aerobee-Hi rocket at 198 km altitude shows many ne emission lines. Among these are the resonance lines of He I, N I, II, III and V, O II, III, I and V, S VI, Ne VIII and Mg X. Present also are many of the higher members of the Lyma series and the Lyman continuum. Lyman gamma is absent, because of absorption by N *Subject Headings:* **1. Sun's ultraviolet spectrum 2. Rocket spectrograph observation.**—*Author abstract.* Ⓢ

12.10–145 551.521:551.507.362

Purcell, J. D. and Tousey, R. (*both, U. S. Naval Res. Lab., Wash., D. C.*), **The profile solar Lyman alpha.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Researc Proceedings of the First Symposium.* Pub. **1960.** p. 590–593. fig., 6 refs. French an Russian summaries p. 590. **DWB** (523.1 I61sp)—Using a 1200 line/mm grating in the 13 order, high resolution Lyman alpha line spectra were photographed from an Aerobee rocket July 21, 1959. Nine exposures were obtained, from 92 to 197 km. The line is very broa with wings extending to 1 Å or more each side of the center, and width at half maximum of t order of 1 Å. There is a broad central absorption, corresponding to the H_3 and K_3 lines CaII. Near the center of this absorption there is a deep and narrow absorption, of optic depth of the order of 1/2. The half width, uncorrected for instrumental profile, is 0.05 This is produced by hydrogen between the earth and sun. The neutral hydrogen quanti above the E-region is approximately 3×10^{12} atoms/cm^3. A comparison is made with da on the night sky intensity in Lyman alpha. (Run from another source as 11I–195, Sept. 19 *Met.Abs.*) *Subject Headings:* **1. Lyman alpha radiation 2. Rocket spectrograph observatio** —*Authors' abstract.* Ⓢ

12.10–146 551.507.362.1:523.743.

Purcell, J. D.; Packer, D. M. and Tousey, R. (*all, U. S. Naval Res. Lab., Wash., D. C.*) **Photographing the Sun in Lyman alpha.** *International Space Science Symposium, Nice, Ja* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 594–598. 4 fig

refs. French and Russian summaries p. 594. **DWB** (523.1 I61sp)—Using a double-dispersing two-grating monochromator, a series of images of the Sun were obtained in the light of Lyman alpha of hydrogen during a rocket flight on March 13, 1959. Comparison is made with CaK and Hα spectroheliograms made at the same time. There is close correspondence between plage areas in Lyman alpha and CaK, but the contrast between plage areas and unexcited regions is approximately twice greater for Lyman alpha than for CaK. The resolution is approximately one minute of arc. Several prominences are visible. The dark features on the disc appear to be somewhat different in character for Lyman alpha than for CaK and Hα. **Subject Headings: 1. Solar photography in Lyman alpha 2. Rocket spectrograph observation.**—*Authors' abstract.* Ⓢ

12.10–147 551.507.362.1:551.521.17

†Rense, William A. (*Physics Dept., Univ. Colo.*), **Solar ultraviolet spectroscopy and applications to problems of the upper atmosphere and the solar corona.** *International Space Science Symposium, Nice, Jan.* 1960, *Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 608–614. 25 refs. Russian summary p. 608. **DWB** (523.1 I61sp)—Results obtained from rocket spectrographs equipped with photographic-type detectors are reviewed. These include: 1) Extension of the solar Fraunhofer spectrum to about 1500 Å and the identification of over 2000 absorption lines. 2) The detection of hydrogen Lyman-alpha and the measurement of its absolute intensity. 3) The determination of the half-width and profile of the hydrogen Lyman-alpha line. 4) The detection of several members of the Lyman series and the continuum. 5) The detection of the ionized helium resonance line at 303.8 Å and the establishment of its relatively high intensity. 6) The wave length measurements and identification of several hundred emission lines extending from about 1900 Å to 80 Å. 7) The measurement of the approximate absolute intensities of several less-intense emission lines. 8) Successful photography of the Sun's disc in hydrogen Lyman alpha radiation. Examples of application to solution of problems of the upper air and solar corona are presented. *Subject Headings:* **1. Solar ultraviolet spectroscopy 2. Rocket spectrograph observation 3. Upper atmosphere research 4. Solar corona.**—*Author's abstract.* Ⓢ

12.10–148 551.521.1 523.742:778.3

Purcell, J. Dewitt and Tousey, Richard (*Naval Res. Lab.*), **Lyman-Alpha photographs of the sun's disk.** *American Geophysical Union, Transactions,* Wash., D. C., 40(2):175–177 June **1959.** photo. **DWB, DLC**—Recently, highly detailed photographs of the entire sun were taken in the light of the Lyman alpha line of hydrogen from an altitude of 12.3 mi by a small solar observatory in the nose of an Aerobee-Hi rocket launched from White Sands, N. M., on March 13, 1959. Evidences of weather in different parts of the solar atmosphere may be seen. Lyman alpha pictures such as those obtained on the March 13 rocket flight show that the radiation is emitted from spots and patches over the solar surface. This knowledge may help us to understand the reasons for the wide range of variations and the rapid changes in quality of radio propagation. *Subject Headings:* **1. Solar photography in Lyman alpha 2. Sun's disk 3. Radio wave propagation.**—*E.Z.S.* Ⓢ

12.10–149 523.74:551.510.62:621.396.9

*†Collins, C.; Jelly, D. H. and Matthews, A. G., **High-frequency radio-wave black-outs at medium and high latitudes during a solar cycle.** *Canadian Journal of Physics,* Ottawa, 39(1):35–52, Jan. **1961.** 8 figs., 2 tables, 26 refs. **DWB, DLC**—Recent studies at the Defence Research Telecommunications Establishment, Ottawa, comparing VHF riometer and HF ionosonde data for the IGY have shown that the two types of absorption events 'polar cap' and 'auroral', can be identified in the occurrence patterns of ionosonde black-outs. A study based on this comparison has been made of all black-outs observed at a number of medium- and high-latitude ionosonde stations during 1949–1959. It has been found that the two kinds of absorption events show markedly different variations during the 11 yrs. Several other temporal and spatial features of the phenomena are also discussed. *Subject Headings:* **1. HF radio wave black-outs 2. Solar cycle—black-out relationships 3. Solar cycle—absorption relationships.**—*Authors' abstract.* Ⓢ

12.10–150 523.164.82:523.74

Maltby, Per, **Distribution of origin and decay of noise storms on the solar disk.** *Astro physica Norvegica*, Oslo, 6(13):147–160, Aug. **1960.** 5 figs., 16 refs., 4 eqs. **DWB**—It is foun that noise storms tend to originate on the eastern half of the solar disk, while more noise storn decay on the western half. The analysis is based on interferometer data from the Nera statio of the Netherlands PTT and radiometer observations at the Solar Observatory, Harestua. A attempt is made to explain the observed asymmetry in start and decay in terms of the limitin isodiaphanous surface and the angular emission diagram of the radio source. An asymmetr in the observed distribution of noise storms on the solar disk indicates that the angular emissio diagram of the radio source is not perpendicular to the surface of the sun. *Subject Heading* **1. Solar noise storms 2. Solar disk.**—*Author's abstract.* Ⓢ

12.10–151 523.164.82:523.74

Maltby, Per and Steen, Odd, **On the connection between solar noise storms and observab parameters of sunspots.** *Astrophysica Norvegica*, Oslo, 7(1):1–11, Oct. **1960.** 3 figs., 12 ref **DWB**—Several properties of sunspots are tested as indicators of noise activity. A pronounce connection *si* was found between the darkness of the umbra and noise storms. No genuin unipolar spot showing noise action has been found in the present material. The investigatio is based on optical data from the Mt. Wilson Observatory and the Crimean Astrophysic Observatory. Interferometer and radiometer data are from the station Nera of the Nethe lands PTT and the Solar Observatory at Harestua. *Subject Headings:* **1. Solar noise storm 2. Sunspots as indicators of noise storms.**—*Authors' abstract.* Ⓢ

12.10–152 523.75:546.291:535.

†Tandberg-Hanssen, Einar (*Inst. of Theoretical Astrophysics, Univ. of Oslo and Hi Altitude Obs., Univ. of Colo.*), **An investigation of the temperature conditions in prominenc with a special study of the excitation of helium.** *Astrophysica Norvegica*, Oslo, 6(14):161–20 Aug. **1960.** 22 figs., 21 tables, 81 refs., 81 eqs. **DWB**—The excitation of selected spectr lines in active and semi-active prominences is studied in order to derive information on t temperature conditions in such objects. A special study is made of the excitation of helium prominences, in flares and in the chromosphere. It is concluded that the chromosphere is n optically thin in the infrared HeI, 10830 line. The same applies to strong flares and brig prominences. A homogeneous model of active and semi-active prominences does not satis the observations. Such prominences are built up of different regions where the physical con tions (temperature and/or motions) vary from one region to another. Some comments a made on the possible importance of thermal diffusion and thermal conduction on the phys of prominences. *Subject Headings:* **1. Solar prominence temperatures 2. Helium in pro nences.**—*Author's abstract.* Ⓢ

C3. MOON

12.10–153 523.

Van Diggelen, J., **Hoe ziet de onzichtbare kant van de maan er uit?** [How does t far side of the moon look?] *Hemel en Dampkring, The Hague*, 58(5):108–117, May 19 9 figs. **DWB, DLC**—The article discusses how it is possible to obtain information about t back side of the moon. From the earth we can see more than one-half of the moon (179° the other half (180°5) is partially visible because of certain phenomena. The librati (oscillatory motions) in latitude and in longitude are described and presented in figs.; also t daily libration is discussed; the fourth libration is the physical one. The author gives so details about the shape of the moon, taking into account the Jeffreys theory and the Tissera formula. A chart of the back side of the moon by Wilkins is presented and information ab the border regions and the ring mountains is given. The article is illustrated with very g photographs of the various regions of the moon. *Subject Heading:* **1. Moon's surface.**—*A. V*

12.10–154 523

Joksch, H. C. (*Sternwarte Univ., Münster*), **Die hypsometrische Kurve des Mond** [The hypsometric curve of the moon.] *Zeitschrift für Geophysik*, Würzburg, 23(5):250–2 **1957.** 2 figs., 6 refs. German and English summaries p. 250. **DLC** (QC801.Z4)—Hyp

hnetric curves of the moon are derived from the absolute heights determined by RITTER and FRANZ and HOPMANN; the errors are discussed. Probably the hypsometric curve is a composition of two unimodal frequency distributions. *Subject Headings:* **1. Hypsometric curve of the Moon.**—*Author's abstract.*

12.10–155 523.38:778.3

Strong, C. L., **The amateur scientist [Lunar eclipse, March 13, 1960].** *Scientific American*, New York, 203(6):172–184, Dec. **1960.** 6 figs., 4 photos. **DLC**—Two amateurs, J. F. OSSANNA, JR., and L. C. THOMAS, engineers at Bell Telephone Laboratories, took photographs of the lunar eclipse of March 13, 1960 at North Plainfield, N. J. in full color. The unique feature of this experiment is that the photographers had computed the absolute brightness of the full moon and had taken account of the many optical and photographic variables associated with the eclipse well in advance. The method and reasoning of these calculations is discussed and graphically illustrated. Four samples of the photographs depicting stages in the lunar eclipse of March 13th illustrate the article. *Subject Heading:* **1. Lunar eclipse, March 1960.**—*I.S.* Ⓢ

12.10–156 523.39:778.3

Vainu Bappu, M. K. (*Uttar Pradesh State Obs., Naini Tal*), **Photographic observation of the moon's position.** *Journal of Scientific and Industrial Research, Sec. A*, New Delhi, 17(12), Special Supplement, Dec. **1958.** p. 88–90. 2 figs. (photos), eq. **DWB, DLC**—Brief description of the Markowitz camera as used at the Uttar Pradesh State Observatory at Naini Tal, for day and night time lunar position determinations. A moon photograph taken with the camera on May 7, 1958 is presented. Other applications of the camera in geodetic measurements, include size and shape of the earth, and intercontinental distances which can be made within an accuracy of <100 ft. *Subject Headings:* **1. Lunar position determinations 2. Markowitz camera 3. Geodetic measurements 4. Uttar Pradesh, India.**—*W.N.*

C4. PLANETS

12.10–157 523.43

Meeus, Jean, **Heldere Planetoïden in 1960.** [Bright planetoids in 1960.] *De Meteoor*, Utrecht, 16(2):22–24, April **1960.**—The article gives the ephemerides for the brightest planetoids in 1960. From the 1633 listed minor planets, 24 reach a brightness greater than 11,0. The author gives the ephemerides of 8 Flora, 3 Juno, 6 Hebe, 89 Julia, 2 Pallas, 9 Metis, 39 Laetitia, 30 Urania, 40 Harmonia, 16 Psyche and 52 Europa. *Subject Headings:* **1. Planet observations 2. Planetoids 3. Ephemerides.**—*A.V.* Ⓢ

12.10–158 523.45

Dall'olmo, U., **Prime osservazioni del pianeta Giove nell'opposizione 1960** [First observation of the planet Jupiter during the 1960 opposition.] *Coleum*, Bologna, 28(7/8): 115–116, July/Aug. **1960. DLC**—A brief report of observations made on the evenings of June 6 and 7, 1960. The observations were carried out with 30 cm telescope, focal distance 1:6, at optimal visibility conditions. *Subject Heading:* **1. Jupiter.**—*E.K.* Ⓢ

12.10–159 523.45

Krotkov, R. and Dicke, R. H. (*both, Princeton Univ.*), **Comparison between theory and observation for the outer planets.** *Astronomical Journal*, New Haven, Conn., 64(5):157–163, June **1959.** 9 figs., 2 tables, 6 refs., 10 eqs. **DLC**—The auto-covariance function of the differences between the observed and predicted ecliptic longitudes of Jupiter indicates that these residuals contain a trigonometric term of 4520 days, compared with 4333 days for Jupiter's period, and amplitude 0″.25. No currently known source of systematic error would account for such a period. The residuals for the other outer planets contain no period as marked as the 4520 day period in Jupiter. A secular increase in the eccentricity of $\frac{1}{3}\times10^{-6}$ per century, together with a motion of the perihelion in the direction of Jupiter's revolution about the sun and amounting to 5″.0 per century will, coupled with a term whose frequency is equal to Jupiter's mean motion, produce such a period. If such secular perturbations were produced

by a constant anomalous acceleration of Jupiter, the magnitude of the acceleration required would be about 10^{-8} times the Jovian centripetal acceleration. The data for the other outer planets are inadequate to either confirm or deny the existence of such an acceleration in their motion. *Subject Headings:* **1. Ecliptic longitudes of Jupiter 2. Jupiter's motions 3. Outer planets.**—*Authors' abstract.* Ⓢ

C5. COMETS

12.10–160 523.

Meeus, Jean, **Nieuws van de komeet Burnham.** [News of Comet Burnham.] *Hemel en Dampkring*, The Hague, 58(5):122–124, May **1960.** 2 figs. **DWB, DLC**—Comet Burnham went through its perihelion a little later than was reckoned by MARSDEN. The greatest deviation of MARSDEN's first ephemerides was on April 27, 1960 when the comet was the closest to the earth and reached its greatest brightness: 4.0 magn. The author gives the new ephemerides as calculated by MARSDEN. Comet Burnham reached the greatest N-declination (+77°32′) on April 27, 1960. The article describes the various observations made by the author and also by DE MEYER at St. Kruis-Brugge (Belgium) and by R. ANKERSMIT at Olst (Overijsel-Netherlands). *Subject Headings:* **1. Comet observations 2. Comet Burnham 3. Comet ephemerides.**—*A. V.* Ⓢ

12.10–161 523

Ernst, Bruno, **Op zoek naar komeet Burnham.** [In search of Comet Burnham.] *Hemel en Dampkring*, The Hague, 58(5):124–128, May **1960.** 3 figs. **DWB, DLC**—The article describes a good way to take a photograph, in a short time, of the whole visible region of the firmament. Two necessary considerations are: first, the duration of the exposure and second the number of pictures needed to obtain a photograph of the stars of half the firmament. Sometimes it is very difficult to identify whether a point is a reality in the firmament or is a fault in the photographical process. It is recommended that each photograph be taken twice. *Subject Headings:* **1. Comet observation 2. Sky photographs.**—*A. V.* Ⓢ

C6. METEORS AND TEKTITES

See also: **Principles of meteoritics** (Krinov), 12.10–10; **Study of meteoric particles on 3d. Soviet satellite** (Nazarova), 12.10–84; **Studies of meteoric dust by Sputnik III and space rockets** (Nazarova), 12.10–85; **Meteorites as space probes for investig. cosmic radiation** (Stoenner), 12.10–191.

12.10–162 523

Marchal, Anatole F., **Météores, étoiles filantes, bolides.** [Meteors, shooting stars, fireballs.] *Industrie*, Brussels, 13(6):397–404, June **1959.** 7 photos.—An article about meteors intended for the general public. The first part of the article concerns Comet Belia discovered in 1772, which broke in two parts in 1846 causing a memorable shower of shooting stars on Nov. 27, 1872. In connection with this subject, the author gives the exact meaning of the words meteors, meteorites, swarms, etc. He discusses the discovery of the astronomic characters of meteors, sporadic meteors, and the evolution of swarms. The spectral analysis of meteors is clearly indicated and is followed by an historical account of the various theories which were formulated with regard to the origin of sporadic meteors (SCHIAPARELLI, HAVARD, CORNELL, HOFFMEISTER, WHIPPLE). Radioelectric methods have corroborated the recent theories and it can now be asserted with certainty that sporadic meteorites are permanent members of the solar system. The last part of the article deals with the relationships between age of meteorites and cosmogony. Photographs of meteors illustrate this excellent popular article. *Subject Headings:* **1. Meteors 2. Sporadic meteorites.**—*A. V.* Ⓢ

12.10–163 551.501.81:523

Fialko, E. I. (*Tomsk Polytechnic Inst.*), **Mean hourly rate of meteors recorded by radar. Pt. 1, Meteor stream.** *Soviet Astronomy AJ*, New York, 3(4):612–614, Jan./Feb. **1960.** figs., 6 refs., 13 eqs. **DLC.** Transl. of original Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 36(4):626–628, July/Aug. **1959. DLC**—A general expression is derived for the number

meteors detected by radar under conditions of normal reflection (scattering) of radio waves by an ionized trail in the case of a meteor stream. A simplified formula for calculations was deduced. *Subject Headings:* **1. Radar echoes from meteors 2. Meteor frequencies.**—*Author's abstract.* Ⓢ

12.10–164 551.510.3 :551.510.53 :523.51

Bohn, J. Lloyd and Fuchs, Otto P., **High velocity impact studies directed towards the determination of the spatial density, mass and velocity of micrometeorites at high altitudes.** Temple Univ., Philadelphia. Physics Dept., Contract AF 19(604)-1894, Scientific Report, No. 1, Jan. 31, **1958.** 42 p. 15 figs., 5 tables, 8 refs., 27 eqs. **DWB**—Since, at this time, no measuring instruments are available, whose indications represent a known function of the mass (m) and the velocity (v) pertaining to impacts, the following paper will discuss the particular problem of the development of analytical expressions describing the impact processes. Personal experience, especially observations made by experiments at the shooting range of the German Armed Forces at Kunnersdorf bei Berlin, Germany, suggested a hypothesis about the microstructure of impact processes which takes into consideration all physical magnitudes inherent to the process. This hypothesis will be described and this should enable us later to interpret the responses of various kinds of transducers with respect to the unknown sought. The credibility of this hypothesis is established by comparison of experimental results obtained from the hypothesis in question. The experiments have been executed at a shooting range constructed at Temple University in the velocity range of between 100 and 200 m sec^{-1}, at the shooting range at Kunnersdorf with a velocity of 700 m sec^{-1}, and as far as extreme velocities are concerned, a previous published result has been used with the velocity of 45 km sec^{-1}. The comparison shows that the hypothesis adopted approximates fairly well the experimental results. This paper is preliminary to the solution of the distributions in question. *Subject Headings:* **1. Micrometeorite distribution 2. High velocity impact studies 3. Impact processes 4. Micrometeoritic impacts.**—*Authors' abstract.*

12.10–165 551.507.362 :523.51

Dubin, Maurice, **Direct measurements of meteoritic dust using rockets and satellites.** *International Astronomical Union, Transactions,* 10:714–715, **1958. DLC** (QB1.I6)—This paper discusses the advantages and limitations of measuring the space density and the mass distribution of meteoritic dust in the vicinity of the Earth by rocket and satellite vehicles, and reports a number of such measurements. The first direct measurements were made on V-2 rockets on 8 Dec., 1949 and 31 Aug. 1950. The next measurements were made on an Aerobee rocket on 14 Sept., 1955. A series of five Aerobee rockets was launched on 9 April, 16 July, 14 and 16 Oct., 1957. On 31 Jan., 1958 Aerobee instrumentation was successfully flown in Explorer I. *Subject Headings:* **1. Aerobee rockets 2. Satellite observation of meteors 3. Meteoritic dust.**—*I.S.*

12.10–166 523.51 :546.15 :546.24

†Goles, Gordon G. and Anders, Edward (*both, Univ. of Chicago*), **Iodine content of meteorites and their $I^{129}-Xe^{129}$ ages.** *Journal of Geophysical Research,* Wash., D. C., 65(12):4181–4184, Dec. **1960.** 2 tables, 24 refs., eq. **DLC**—Iodine and tellurium abundances in chondritic meteorites were determined by neutron activation analysis. For bronzite and hypersthene chondrites (6 analyses) iodine abundances from 37 to 104 ppb were found; for enstatite and carbonaceous chondrites (9 analyses), the range is from 127 to 560 ppb. The tellurium abundances range from 0.42 to 0.73 ppm and 1.23 to 3.4 ppm respectively. $I^{129}-Xe^{129}$ decay intervals, measured from the cessation of nucleosynthesis were calculated for the meteorites Richardton (119_{-6}^{+9} m.y.) and Indarch (97_{-10}^{+17} m.y.), using the continuous nucleosynthesis model. The significance of these results is discussed. *Subject Headings:* **1. Chondritic meteorites 2. Meteorite composition 3. Iodine in meteorites 4. Meteorite ages 5. Neutron activation analysis.**—*Authors' abstract.* Ⓢ

12.10–167 523.51

†O'Keefe, J. A. (*Goddard Space Flight Center*), **The origin of tektites.** *U. S. National Aeronautics and Space Administration, Technical Note* D-490, November **1960.** 26 p. 2 figs.,

tables, 74 refs., numerous eqs. **DWB, DLC.** Also in: *International Space Science Symposium Nice, Jan. 1960, Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 1080–1105. 2 figs., table, 68 refs. Russian summary p. 1080. **DWB** (523.1 I61sp)—The composition and distribution of tektites, with the fact of apparent ablation in flight, strongly suggest extraterrestrial origin. Thermodynamic considerations suggest their arrival in orbits nearly parallel with the Earth's surface, resulting from the decay of a natural satellite orbit. Comparison of the great meteor procession of 1913 with the re-entry of artificial satellite 1957 Beta suggests that the meteor procession resulted from the ablation of such a single body. It is shown that the ultimate source of the original tektite-producing body probably is the moon and it is suggested that the Igast object alleged to have fallen in 1855 is genuine and is an unmelted portion of the lunar crust. *Subject Heading:* **1. Tektite provenance.**—*NASA.*

12.10–168 523.5

Varsavsky, Carlos M. (*Mt. Wilson and Palomar Obs.*), **Tektites and their origin.** *Astronomical Society of the Pacific, San Francisco, Leaflet,* No. 365, Nov. **1959.** 8 p. 2 figs. **DLC** (QB1.A422)—This is a descriptive account of "tektites," particles of a glass-like substance found in limited regions of the earth. Their origin, appearance, composition and distribution are described in popular style. The author believes that "tektites" are not a terrestrial phenomena and come from the moon. The evidence in support of this hypothesis and the process involved in the formation and ejection of the "tektites" from the moon are discussed. *Subject Headings:* **1. Tektites 2. Tektite provenance.**—*I.S.* Ⓢ

C7. RADIO ASTRONOMY

See: **Radioastron. res. using satellites** (Getmantsev), 12.10–80.

D. OUTER ATMOSPHERE

D1. IONOSPHERE

12.10–169 551.510.535:523.164.8

Argence, E.; Harnischmacher, E.; Hess, H. A. et al., **Sur le calcul de l'effet Faraday relatif à l'ionosphère.** [The calculation of the Faraday effect relative to the ionosphere] *Annales de Géophysique,* Paris, 16(2):272–275, April/June **1960.** 2 figs., 9 refs., 29 eqs. French. English and Russian summaries p. 272. **DLC**—Some relations concerning the Faraday effect are established in order to study the observations of the radio transmissions made with the artificial satellite 1958, Delta 2 (Sputnik III) at Breisach (Germany). The effect is also examined for frequencies higher than 100 MHz in view of studies of lunar echoes and their interest for the structure of the ionosphere. *Subject Headings:* **1. Ionospheric structure 2. Satellite ionospheric observation 3. Lunar radio echoes 4. Faraday rotation. I. Rawer, K.** —*Authors' abstract.* Ⓢ

12.10–170 621.396.8:551.510.535:551.594.2

Blackband, W. T. (*Royal Aircraft Estab., Farnborough, Eng.*), **The determination of ionospheric electron content by observation of Faraday fading.** *Journal of Geophysical Research,* Wash., D. C., 65(7):1987–1992, July **1960.** 9 figs., 5 refs., eq. **DLC.** Also in *International Space Science Symposium, Nice, Jan. 1960, Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 387–396. 9 figs., 4 refs., eq. Russian summary p. 38[illegible] **DWB** (523.1 I61sp)—From a study of the Faraday fading of signals transmitted from a satellite on 20 or 40 Mc/s the total electron content between satellite and observer can be determined. In special cases a simple interpretation of the records is possible. This method can be applied to the study of the ionosphere above the F2 maximum. The results of preliminary experiments are presented. A form of satellite transmission is described which would be particularly suitable for such studies. *Subject Headings:* **1. Ionospheric electron density calculations 2. Faraday rotation 3. Satellite ionospheric electron density measurements.**—*Author's abstract.* Ⓢ

12.10–171 551.510.535:551.594.13

Cowling, T. G., **The electrical conductivity of the ionosphere.** *International Council of Scientific Unions. Mixed Commission on the Ionosphere, 3rd, Canberra, Australia, Aug. 24–26, 1952, Proceedings*, pub. **1953.** p. 106–109. 10 refs., eqs. **DWB**—Chapman's dynamo theory of lunar geomagnetic variations proves that conductivity of ionosphere is $2.5 \times 10^5/f$. Recent research shows that conductivity arises in equatorial regions mainly from lower part of E layer. According to HÜONO, there is enhanced conductivity near the magnetic equator due to polarization mechanism. According to SCHLUTER, the total electric force can be divided into original electric force and secondary electric force. His analysis cannot be applied to ionosphere due to the presence of large numbers of neutral atoms. *Subject Heading:* **1. Electrical conductivity in ionosphere.**—*A.H.K.*

12.10–172 551.510.53:551.594.13:550.385.26

Nishida, Atsuhiro and Fukushima, Naoshi (*both, Geophysical Inst., Tokyo Univ.*), **Three-dimensional consideration for current-system of geomagnetic variations (II) Sq-field.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere and Space Research in Japan*, 13(4):273–282, **1959.** 2 figs., 4 tables, 4 refs., 33 eqs. **DWB, DLC**—The equivalent electric current-system for the geomagnetic Sq variation is examined on the basis of a three-dimensional model, where the thickness of the conducting region is taken into account. The conducting region is assumed to be a spherical layer of the 70 km thick with homogeneous and isotropic electrical conductivity, and the wind velocity independent of height. The result shows that the poloidal electrical current and the associated toroidal magnetic field appearing only in a three-dimensional treatment are less than one-tenth in magnitude of the total current and field. It is concluded therefore that two-dimensional calculation hitherto made is approximately valid, so far as the vertical thickness of the conducting layer is small compared with the horizontal extension of the current-bearing layer of homogeneous conductivity. *Subject Headings:* **1. Sq variations 2. Ionospheric models 3. Electric currents in ionosphere 4. Geomagnetic variations.**—*Authors' abstract.* Ⓢ

12.10–173 551.510.535:551.594.13

†Robinson, B. J. (*Radiosterrewacht, Dwingeloo, Netherlands*), **On some disturbances in the E-region.** *Journal of Atmospheric and Terrestrial Physics*, London, 19(3/4):160–171, Dec. **1960.** 7 figs., table, 20 refs. **DWB**—Some common interpretations of features on E region $h'(f)$ curves have been compared with the behavior deduced from the shape of the layer ($N(h)$ curves), determined from high-resolution $h'(f)$ curves. It is shown that the current distinction between "abnormal E" and "E2", on the basis of the group retardation observed, may not be tenable. Two well-known cases of moving disturbances on the $h'(f)$ curve are found to be due to a redistribution of the ionization in the layer. It is also shown that the international definition of f_0E does not always give a reliable estimate of the maximum electron density when the $h'(f)$ curve has a complex shape. *Subject Heading:* **1. E region disturbances.**—*Author's abstract.* Ⓢ

12.10–174 551.510.535:551.594.13

Umlauft, G., **Focusing of electromagnetic waves by E_s-clouds.** *Journal of Atmospheric and Terrestrial Physics*, London, 18(2/3):253–255, June **1960.** 5 figs. **DLC**—Histograms of f_0-values with and without influence of E_s obtained at Lindau and Tsumeb are shown. The observation does not lend itself to an explanation by means of focusing effects, the objection being that such abnormally high values are never observed in the absence of E_s echoes, which is the much commoner condition in this case. Two possible explanations of the phenomena are presented. First, it is shown that these observations can be explained by a focusing effect of the E_s clouds. Secondly, the phenomena is explained by assuming that E layer sometimes consists of clouds with dimensions of the order of kilometres. *Subject Headings:* **1. Electromagnetic waves 2. E_s cloud focusing effects.**—*I.S.* Ⓢ

12.10–175 551.510.535:551.594.12

Setty, C. S. G. K. (*Dept. Physics, Cent. Coll., Bangalore*), **Some studies of bifurcation of the ionospheric *F*-layer into *F*1 and *F*2.** *Journal of Atmospheric and Terrestrial Physics*,

London, 19(2):82–87, Oct. 1960. 4 figs., 6 refs., 5 eqs. **DLC**—Observations made at frequen intervals with a panoramic ionosphere recorder at Cambridge during the sunspot minimum y 1954 and 1955 show that the splitting of the F layer into F1 and F2 occurs at the time ground sunrise. The F1 layer is usually present throughout the year except in the winte The height at which the F1 layer maximum occurs remains constant for at least 2 hr after first appears with the sunrise. Also it seems to vary with the season, being the highest summer and the lowest in winter. The F layer under storm condition on Feb. 25, 1956 follow ing the great cosmic ray burst that was observed on Feb. 23, developed a subsidiary maximu which under normal conditions would be identified as the F1 layer. No such substratificati was noticed on the subsequent days. Under quasi-equilibrium conditions, which occur durin the midday, it can be shown from the simple Chapman theory of layer formation, with a attachment-like law for the loss-process, that there should be no maximum of ionization undl certain conditions of the atmospheric scale-heights. However a numerical solution of th continuity equation for electrons shows that a maximum of ionization does occur at sunri when the equilibrium condition is not yet reached. *Subject Headings:* **1. F layer bifurcati 2. Ionospheric height variations.**—*Author's abstract.* Ⓢ

12.10–176 551.510.535:551.594.12:525.7

Setty, C. S. G. K. (Dept. Physics, Cent. Coll., Bangalore), **A pre-sunrise phenomenon a the presence of negative ions in the F-region of the ionosphere.** *Journal of Atmospheric a Terrestrial Physics*, London, 19(2):88–94, Oct. **1960.** 3 figs., 6 refs., 2 eqs. **DLC**—Freque observations made on the F layer with a panoramic ionosphere recorder and a detailed analy of the observations, using D. H. SHINN'S method to reduce the observed $h'(f)$ curves to $N($ and $N(t)$ curves at a series of heights, has shown the existence of a pre-sunrise increase of ioniz tion which can be attributed to the presence of negative ions in the F layer at night. M favorable days for such observations are in the months of May and July when there is a l interval between the times of sunrise at the layer and that when the main photo-ionizati process becomes effective. If the assumption is made that the electrons are released from t negative ions formed at night by the visible radiation from the sun then the calculated rate production of electrons, from the observed $N(t)$ curves yields a value for the coefficient detachment β for atomic oxygen which is in excellent agreement with the theoretical value giv by D. R. BATES and H. S. W. MASSEY. A small delay in the time of reversal of the observ $N(t)$ curve and the layer sunrise allows an estimation of the height of the "screening" layer be made. The estimated value agrees well with those reported earlier for the lower ionosphe layers. *Subject Headings:* **1. F layer ionization 2. Negative ions 3. "Sunrise effects" ionosphere.**—*Author's abstract.* Ⓢ

12.10–177 551.510.535:551.594

Taylor, G. N. (*Nuffield Radio Astron. Labs., Univ. of Manchester, Jodrell Bank.*), **T total electron content of the ionosphere during the magnetic disturbance of Nov. 12–13, 19** *Nature*, London, 189(4766):740–741, March 4, **1961.** fig., table, 5 refs. **DWB**—Measu ments of the total electron content of the ionosphere by observation of the differential Farad fading of lunar radio echoes on two closely spaced frequencies are now being made with equ ment mounted on the 250 ft Jodrell Bank radio telescope. This paper describes the resu obtained during the magnetic disturbance of Nov. 12–14, 1960. Graphs are given showing variation of total electron content, the maximum electron density (at Slough) and the Hartl K indices on each of the days. The approximate time of the sudden commencement is a indicated. The observations show that on this occasion the reduction in maximum elect density was accompanied by a proportional reduction of total electron content. Thus th appears to have been a scaling down of the whole ionosphere rather than a vertical redistribut of ionization within it. *Subject Headings:* **1. Ionosphere 2. Electron content.**—*R.B.* Ⓢ

12.10–178 551.510.535:550.385

Ziauddin, Syed (*U. Saskatchewan; on leave U. Mysore, India*), **Simultaneous observati of pulsations in the geomagnetic field and in ionospheric absorption.** *Canadian Journa Physics*, Ottawa, 38(12):1714–1715, Dec. **1960.** 5 refs. **DWB, DLC**—During the latter p of Sept. 1959, a cosmic noise absorption monitor (sometimes called a riometer) and a m

riometer were operated at Saskatoon with the recording meters running a sufficiently high chart speed (12 inches/hour) to permit fluctuations of a few seconds duration to be resolved. The riometer, operating on a frequency of 34 MC/s, is broadly similar to that described by Reid and Collins (1959) and the magnetometer is of the standard three-component fluxgate type described by Serson (1957) but only one (the *H*) component was recorded at high speed. On the 20th and 21st of Sept., shortly after 7 a.m. local time, regular pulsations were recorded simultaneously on both of the records. The magnetic pulsations of amplitude 30–50 gamma, together with the simultaneously recorded pulsations in cosmic noise absorption, of amplitude 2.5–3 db, are shown in Figs. 1 and 2. The riometer record indicates the amount of absorption suffered by extraterrestrial radio waves as they traverse the ionosphere while the magnetometer record indicates the variations of the earth's magnetic field due, presumably, to currents located either in the lower ionosphere or at great distances from the earth. Cosmic noise absorption is usually attributed to abnormal increases in the electron density, collision frequency, or both at heights below about 95 km in the atmosphere. Jacobs and Obayashi (1958) have found experimental evidence in support of the suggestion that some magnetic pulsations are due to a toroidal hydromagnetic oscillation of the earth's outer atmosphere of the kind proposed by Dungey (1954). According to this picture the period of oscillation should change with geomagnetic latitude and for the geomagnetic latitude of Saskatoon (60.5°N) should be about 2.5 minutes. The observed periods, ranging from 2.5 to 3.0 minutes, are in good agreement with the predicted value and suggest that the pulsations are, in fact, due to toroidal hydromagnetic oscillations of the outer atmosphere. Akasofu (1959) has concluded on theoretical grounds that the energy dissipated in the ionosphere by hydromagnetic waves would cause only a negligible rise in temperature, so that it is necessary to look for some indirect connection between these two simultaneously occurring phenomena. One possibility is that extra ionization in the lower ionosphere (observed by the riometer) is being caused by the periodic influx of particles. These particles could, in turn, be accelerated during some part of each cycle of the hydromagnetic oscillation of the outer atmosphere. *Subject Headings:* **1. Geomagnetic pulsations 2. Ionospheric absorption 3. Cosmic noise absorption 4. Riometers 5. Hydromagnetic oscillation of the outer atmosphere 6. Saskatoon, Canada.**—*From author's letter to editor.* Ⓢ

12.10–179 525.75:551.510.535:621.396.1

Rieker, Jean (*Inst. Suisse de Mét., Zurich*), **Le lever du soleil dans l'ionosphère et ses répercussions sur la propagation des ondes longues.** [Sunrise in the ionosphere and its effects on long wave propagation.] *Geofisica Pura e Applicata*, Milan, 46:241–328, May/Aug. **1960.** 35 figs., tables, bibliog., p. 324–325, eqs. French, English and German summaries p. 241–243. **DWB, DLC**—In the first Chapter, the author determines experimentally the altitude at which occurs the early morning fading of the propagation of the long waves (27 kc/sec) originating in the tropospheric thunderstorms, on the basis of the records of the narrow sector radiogoniograph of the Swiss Meteorological Office. The time differences between the interruptions of the recordings of the thunderstorm sources and the astronomical sunrise at Zurich, adopted as reference time, are grouped according to the azimuth between 160° and 300° and represented as function of the azimuth of the rising sun at Zurich. By means of Lugeon's "Tables Crépusculaires," the author searches in space for points *M* being such that the respective time differences between the astronomical sunrise at each of them and at Zurich give curves which are comparable to the empirical functions defined above. It follows that the interruption of the propagation coincides sensibly with the time of sunrise at the altitude of 75 km on the wave trajectory, bearing in mind the delay of about 10 minutes due to the active part of the ozone layer; the height of this active part has been found at about 28 km. The average positions of the thunderstorm sources have been deduced from the distribution of the numbers of thunderstorm days all over the world. Finally, the author verifies that this model corresponds to the reality, taking account of the angular distances of the sources. The second Chapter deals with the sun-rise effect, particularly the "nose," often to be seen on the records of the impulse counter (atmoradiograph). The theory discussed is based upon a simple geometrical model of the propagation and on the results of the first Chapter. This theory is then applied to 10 special cases, the recordings of which have been obtained as follows: Some hours before sunrise, the reception frames of the narrow sector radiogoniograph are stopped in "privileged" direction

and the received impulses are fed into the atmoradiograph. The obtained recordings are i satisfactory accord with the process of the "transitory" propagation, provided that the source are known. Sometimes, two or three "satellites" or "noses" are to be seen; they have all bee explained. The author is lead to the conclusion that the "nose" begins the very moment, whe the last reflection occurs on the D-layer, all the other taking place on the lower part of th E-region in the dark zone. The "nose" ends when the first ionising sunrays intersect the wav trajectory at about 75 km in the neighborhood of the last but one reflection point. In th third chapter, the author improves the first model developed in the Ch. I and II, adapting it t the present knowledge of the ionosphere. The electronic density having to be considered as continuous function of the height, the author shows that there must be a phenomenon refraction on the surface formed by the first ionizing rays of the rising sun in the region betwee the D and E layers, if the reflections obey to the law of metallic reflection. The first mod keeps its whole value in spite of the new conception. *Subject Headings:* **1. Solar influence 2. Ionosphere 3. Solar influences on long wave propagation.**—*Author's abstract.* Ⓢ

12.10–180 551.510.53

Banerji, R. B. (*Univ. of New Brunswick, Fredericton, N. B., Canada*), **Anisotropy i ionospheric diffraction and its effect on drift measurement.** *Physical Society of Londo Proceedings* [*Sec. A?*], 76(492):959–968, Dec. 1, **1960.** 2 figs., 14 refs., 24 eqs. **DLC**—A attempt was made by the author a few years ago to combine the geometrical approach PÜTTER and the statistical approach of BRIGGS and SPENCER to the problem of ionosphere dri measurement. The combination gave rise to a method of wind measurement which w nearly as simple as that of PÜTTER and yet vigorous enough to eliminate the effect of rando changes in the ground diffraction pattern. However, the method could not be proved vali when the ground pattern was statistically anisotropic. The present paper develops a meth involving the use of five statistical parameters and a few simple algebraic formulas, whic take into account the effects of random motion as well as anisotropy. The intuitive clarity the geometrical picture is, however, unfortunately lost. *Subject Heading:* **1. Ionospher drift measurements.**—*Author's abstract.* Ⓢ

12.10–181 551.510.535:551.524

Burkard, O. (*Institut für Meteorologie und Geophysik, Graz Univ.*), **A maximum of tempera ture in the middle ionosphere.** *Nature*, London, 189(4763):474, Feb. 11, **1961.** 3 ref **DWB**—From data of the change of electron-density with height over Puerto Rico, the heig dependence of scale height and density have been computed. During the day the scale heig has a maximum at about 200 km. the value and the height of which show considerable daily an yearly variation. Above this maximum the scale height decreases rapidly. *Subject Heading* **1. Ionosphere temperature 2. Puerto Rico.**—*R.B.* Ⓢ

D2. COSMIC RAYS

12.10–182 551.510.535:538.6:551.521.64(9

Forbush, S. E. and Vestine, E. H. (*Carnegie Inst., Wash., D. C.*), **Ionospheric magnet fields during marked decreases in cosmic rays.** *Indian Journal of Meteorology and Geophysic* Delhi, v. 5, Spec. No.: 113–116, Dec. **1954.** table, 6 refs., eqs. **DWB**—This paper estimat the magnetic fields in the ionosphere from the separation of the ordinary and extraordina radio wave components at critical penetration frequency, at times of large cosmic ray decreas The ionospheric records for Watheroo, Australia are studied. On the basis of these recor estimates of magnetic fields are made for the storm of July 26, 1946, the storm of April 2 1946 and for the small magnetic storm of March 1, 1942. Values of ionospheric magnetic fie during various magnetic storms and average departures in cosmic ray intensity are tabulate *Subject Headings:* **1. Ionospheric magnetic fields 2. Cosmic ray decreases 3. Magnetic fie computations 4. Watheroo, Australia.**—*I.S.*

12.10–183 551.501.9:551.521.6

Korff, Serge A. (*New York Univ.*), **Geographical aspects of cosmic-ray studies.** *Ge graphical Review*, N. Y., 50(4):504–522, Oct. **1960.** 9 figs., table, refs. **DWB, DLC**—T earth's magnetic field sorts the incoming cosmic ray particles according to their energy, a

hose of lowest energy approach the top of the earth's atmosphere at high geomagnetic latitudes. In order to study cosmic radiation several stations have been established at many points on the earth's surface. This extensively illustrated paper is concerned with those stations which are established at high elevations. Some of the factors governing their locations are reviewed, and the reasons why a chain of such stations is required to study the phenomena of geophysics on a world-wide scale are discussed. *Subject Heading:* **1. Cosmic ray observation stations.**—*I.S.*

12.10–184 551.524:551.521.64

†Maeda, Kaichi (*Univ. Maryland*), **Directional dependence of atmospheric temperature effects on cosmic-ray muons at sea-level.** *Journal of Atmospheric and Terrestrial Physics*, London, 19(3/4):184–245, Dec. **1960.** 24 figs., 56 refs., 8+ eqs. **DWB**—The coefficient of atmospheric temp. effects on the hard component of cosmic ray at sea level is derived as a function of the cut-off energy and the aperture of measuring instrument and of the atmospheric depth of reference level. The derivation of these coefficients is primarily based upon the solutions of diffusion equations for cosmic ray mesons in the standard atmosphere, taking the curvature of isobar levels into account. Secondly, the influence of geomagnetic deflexion of muons in the atmosphere is also considered. The main feature of these coefficients is generally in agreement with DORMAN's results, except for large zenith angle. Among the results, the following points are to be noted: (1) There is a direction of maximum negative temp. effect around the zenith angle of 75°, which shifts slightly towards larger angle for higher energy and decreases with the height of reference level. (2) The coefficient of total effect (positive and negative temp. effects) for small zenith angle is nearly constant against atmospheric depth. (3) Influence of geomagnetic deflexion of muons upon the positive temp. effect is negligible even at the geomagnetic equator, but it is not negligible for the negative effect; the absolute value of the coefficient becomes larger for positive muons than for negative muons arriving from the east direction, and the change is reversed for the muons from the west. (4) Contribution of cosmic ray K muons to the atmospheric effect is to suppress the increase of positive temp. coefficient with increase of energy, but the effect seems undetectable due to the existence of an upper limit of magnitude of this effect. *Subject Headings:* **1. Temperature effects on cosmic rays 2. Cosmic ray muons 3. Geomagnetic effects.**—*Author's abstract.* Ⓢ

12.10–185 551.521.64:551.508.91

Naranan, S.; Raghavan, R.; Ramanamurthy, P. V. et al. (*all, Tata Inst. Fund. Res., Bombay*), **Cloud chamber evidence for the presence of simultaneous high energy nuclear-active particles at mountain altitudes.** *Il Nuovo Cimento*, Bologna, Ser. 10, 16(3):401–411, May 1, **1960.** 2 figs., table, 8 foot-refs. English summary p. 401. Italian summary p. 411. **DLC**—In an examination of twenty-two thousand pictures of penetrating showers recorded with a multiplate cloud chamber (60 cm×60 cm×20 cm), in a time of operation of 5310 hrs, at an altitude of 2.2 km, thirty-two cases have been obtained in each of which two or more simultaneous parallel high energy nuclear-electromagnetic cascades, (~100 Ge V), are seen developing in the plates of the chamber. The visible energy of the individual cores has been determined by the track length method. It is found that in most of the cases the visible energies of the parallel cascades in a picture are of comparable magnitude. The separation between the cores ranges from 5 to 40 cm, and the corrected distribution looks flat. There is clear indication that about half the events are associated with dense air showers. The "unassociated" events have been interpreted in terms of local nuclear interactions of particles of energy $\geqslant$ 450 Ge V in air up to a height of 140 m above the apparatus. The "associated" events have been explained as being parts of air showers containing about 100 nuclear-active particles of energy $\geqslant$ 100 Ge V near the core. *Subject Headings:* **1. Cosmic ray events at high altitudes .2. Cloud chamber studies 3. Cascade theory. I. Sreekantan, B. V. II. Subramanian, A.**—*Authors' abstract.* Ⓢ

12.10–186 551.510.53:551.521.64

Neher, H. V. (*Norman Bridge Lab. of Physics, Calif. Inst. of Tech., Pasadena*), **Change of cosmic rays in space.** *Nature*, London, 184(4684):423–425, Aug. 8, **1959.** fig., 7 refs. **DWB**—The author discusses the results of measurements of the absolute intensity of number of primaries in April and of its variation with time carried out during 1954–1958. Three methods

for arriving at the numbers of primary in 1954 together with new results obtained near th north geomagnetic pole in the summer of 1958 are presented. The first method of estimati the number of primaries was to calculate the number causing the difference between 1954 an 1958 and adding to this the number present in 1958. Another method for arriving at the tot number of particles responsible for the difference between 1954 and 1958 was to estimate th mean specific ionization per particle at the top of the atmosphere. The third method involve taking increments in the area under the ionization depth curves for changes in latitude: thr values 0.26, 0.24 and 0.31 par cm^{-2} sec^{-1} $sterad^{-1}$, an average of 0.27 par cm^{-2} sec^{-1} $sterad^{-1}$ or near the north geomagnetic pole in the summer of 1954. The corresponding total intensi in space was 3.1 cm^{-2} sec^{-1} through a sphere of unit area. In 1958 the intensity at or near th pole was 0.047 par cm^{-2} sec^{-1} $sterad^{-1}$ or 0.59 cm^{-2} sec^{-1} through a sphere of unit area. Hen the number of particles in space near the Earth, but sufficiently far removed to be free from an of its effects changed by a factor of 5 during the four year interval. The data on cosmic ra particles in space provided by Pioneer IV and by the Russian rocket, launched on Jan. 2, 19 were 1.8 ± 0.3 par cm^{-2} sec^{-1} and 2.3 par cm^{-2} sec^{-1} respectively. The reasons why the valu measured by rockets at the beginning of 1959 are higher than those calculated from terrestri measurements in 1958 are (1) the fact that cosmic ray intensity near the orbit of the Ear reached a minimum in the summer of 1958 and had begun to climb by Jan. 1959 and (2) t instruments in the rockets were surrounded by the material of the vehicle. The ionizati at the pole was at least 530 ions cm^{-2} sec^{-1} atm^{-1} of air at the highest altitude reached. space this number would just be doubled. In terms of radiological units there would be 1,060 ions cm^{-2} sec^{-1} $atm^{-1} = 1.8$ mr (milliroentgens), per hour at a solar minimum. *Subj Headings:* **1. Cosmic ray primary particles 2. Cosmic ray variations at high altitudes.**—*I.L.D.*

12.10–187 551.508.91:539.18 551.521.

Pomerantz, Martin A.; Potnis, V. R. and Agarwal, S. P. (*all, Bartol Res. Found., Frankl Inst., Swarthmore, Penna.*), **Cosmic ray investigations with an airborne neutron monit** *Il Nuovo Cimento*, Bologna, Ser. 10, 16(3):469–475, May 1, **1960.** 4 figs., table, 6 foot re English summary p. 469. Italian summary p. 475. **DLC**—A neutron monitor has been operation aboard a magnetic survey aircraft. During a cruise in Nov, 1958, the latitude effe of the nucleonic component was measured over the same route between Tokyo and the Aleuti Islands as that covered by SANDSTRÖM in Feb. 1957. Although the two sets of data normaliz at Tokyo are in agreement up to approximately 43°N (modified geomagnetic latitude), change in the shape of the curve had occurred at higher latitudes. The intensity at 55° had decreased by 13%, and the "knee" had shifted from 47°N to 43°N. The latitude variati of the absorption mean free path was determined from intensity vs. altitude curves at geoma netic latitudes 50°N, 25°N, and 13°N. A change of roughly 10% over a range of prima cut-off rigidity from 2 GV to 15 GV was indicated. Comparison with earlier results of othe revealed no appreciable variation of the mean free path during the solar cycle. *Subject Hea ings:* **1. Neutron counters 2. Latitude effects on cosmic rays 3. Nucleonic components cosmic rays.**—*Authors' abstract.* Ⓢ

12.10–188 551.521.

Rossi, Bruno, **High-energy cosmic rays.** *Scientific American*, N. Y., 201(5):134–1 Nov. **1959.** 9 figs. (incl. photo). **DWB, DLC**—A review of the theories of the origin cosmic rays with emphasis on the source of high-energy particles. One of the major difficult in determining the source is that shower intensities appear to be of equal frequency in all dir tions. It is suggested that our picture of the galaxy and its magnetic fields needs a revisi Possibly the gas clouds and associated fields extend beyond the flat disk to form a roug spherical halo. Reference is made to experiments now under way at Volcano Ranch N Mexico, Bolivia, U.S.S.R., and Japan which may contribute helpful details. The illustrati which are included show graphically the analysis of shower development: how showers recorded, the distribution of fairly large and very large showers, a conventional picture of galaxy, an air shower front, plots of shower location, an energy spectrum of primary cosm ray particles and detector arrays in India, Bolivia and Agassiz. *Subject Headings:* **1. Cosm ray origin 2. Cosmic ray theories 3. Cosmic ray showers 4. Cosmic ray distributi** —*E.Z.S.* Ⓢ

12.10–189 551.508.25 551.521.64

Torizuka, Kazuo and Wada, Masami (*both, Cosmic-Ray Lab. of the Institute*), **A large cosmic-ray meter and cosmic-ray short period fluctuations.** *Tokyo. Institute of Physical and Chemical Research, Scientific Papers*, 54(2):162–169, June **1960.** 3 figs., 9 refs. **DWB**—A large cosmic-ray meter with the accuracy of 0.3% for one minute counting rate was constructed by using the particle density detector of the air shower apparatus at the Institute for Nuclear Study in Tokyo. The observation of cosmic-ray intensity by this apparatus was started in April 1959. One of the main interests of operating such high sensitive apparatus is to investigate the short period fluctuation of cosmic-ray intensity, the time scale being in the order of a few to a few tens minutes. Results of analysis of data obtained in April and May 1959 are (1) the amplitude of short period fluctuation varied diurnally with maximum in the daytime, and (2) the above fluctuations varied also from day to day and showed a positive correlation with mean cosmic-ray intensity. (3) Any coherent periodic short time fluctuations were not found. Brief discussions on these results are given. *Subject Heading:* **1. Cosmic ray instruments.**—*Authors' abstract.* Ⓢ

12.10–190 551.521.64

Über de kosmische Strahlung. [Cosmic radiation.] *Weltraumfahrt*, Frankfurt a.M., 1(2):71–72, June **1959.** 6 refs., 6 eqs. **DLC**—The U. S. Satellite, 1958 Epsilon (Explorer IV) discovered above the equator at an altitude of 1000 km and beyond the existence of a heavy radiation belt, which consists of protons and electrons. The atmosphere and especially the ozone layer permit only a small part of this radiation to arrive to the earth surface. The discovery of this radiation belt offered evidence referring to the origin of mesons. It was found that protons coming from the outer space produce mesons. Three types of mesons were established, the τ-, π-, and μ-mesons, one deriving from the other and characterized by the successive loss of energy. These different types of mesons are discussed. *Subject Headings:* **1. Cosmic radiation 2. Meson types 3. U. S. satellite, 1958 Epsilon (Explorer IV).**—*E.K.* Ⓢ

12.10–191 551.521.64:523.51

Stoenner, R. W.; Schaeffer, O. A. and Davis, R., Jr. (*all, Chem. Dept., Brookhaven Natl. Lab.*), **Meteorites as space probes for testing the spatial constancy of cosmic radiation.** *Journal of Geophysical Research*, Wash., D. C., 65(10):3025–3034, Oct. **1960.** 5 figs., 3 tables, 14 refs. **DLC**—An experiment has been performed to test the spatial constancy of cosmic radiation within the solar system by measuring a short-lived and long-lived cosmic-ray-induced radioactivity in a recently fallen stone meteorite. The measurement was performed on the Hamlet chondrite that fell in Indiana on Oct. 13, 1959. The ratio of the 35-day argon 37 to the 325-year argon 39 was found to be 2.0 ±0.3. The relative production rates for these isotopes was determined by bombarding the meteorite with 3-bev protons. The ratio of the argon 37 to argon 39 production rates was found to be 1.5 ±0.2. Since the ratios were the same within experimental uncertainty, it was concluded that the flux of cosmic radiation is constant in the space between the earth and the asteroidal belt. The argon 30 contents of four other chondrites were measured. The values obtained were as follows: Richardton 7.1 ±0.6, Murray 9.4 ±0.5, Forest City 11.9 ±0.5, Benton 9.0 ±0.4, and Hamlet 7.8 ±0.2 dis/min kg. *Subject Headings:* **1. Cosmic ray measurement techniques 2. Meteorites 3. Cosmic ray effects on meteorites.**—*Authors' abstract.* Ⓢ

D3. GEOMAGNETISM

See also: **Results of Pioneer V magnetometer exper.** (Coleman et al.), 12.10–81; **Electron content of ionos. during magn. disturb.** (Taylor), 12.10–177; **Pulsations in geomag.-field and in ionos. absorp.** (Ziauddin), 12.10–178; **Ionos. magn. fields** (Forbush, Vestine), 12.10–182.

12.10–192 550.380.2(547.1)

Basu, S. et al., **The Alibag Magnetic Observatory, 1904–1954.** *Indian Journal of Meteorology and Geophysics*, Delhi, v. 5, Special Number, p. 3–18, Dec. **1954.** 7 photos. Also their: **Early history of geomagnetic observations in India at Colaba Observatory, Bombay, 1841–1906,** p. 19–22. Also their: **Bibliography of 802 papers issued from Magnetic Observa-**

tory, Bombay, p. 28–32. Also special section of portraits and biographical notes on director of Alibag Magnetic Observatory. p. 23–27. **DLC** (AC851.I285)—The articles describe th fortunate establishment of the Colaba Observatory at Bombay in 1840 (owing to difficulties i establishing Magnetic Observatory at Oden where a meteorological and time observatory ha been operating since 1826) and removal to Alibag in 1904 when electric transportation became problem in Bombay; the location, buildings (illustrated) and equipment are described. *Subje Headings:* **1. Geomagnetic observatories 2. Alibag Magnetic Observatory 3. History o geomagnetic observatories in India 4. Biographies 5. Geomagnetism bibliographie 6. Bombay, India. I. Bombay, India. Alibag Observatory.**—*M.R.*

12.10–193 550.385.4:523.7

Dvoriashin, A. S. (*Acad. Scie., U.S.S.R.*), **On the statistics of geomagnetic disturbance and active solar regions.** *Soviet Astronomy AJ*, New York, 3(4):606–608, Jan./Feb. **1960** fig., 15 refs. **DLC.** Transl. of original Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 36(4) 620–622, July/Aug. **1959. DLC**—The method of superposed epoch is applied to geomagnet disturbances for 1942–1944. The CMP of plages plotted on the maps of (3) is taken as th zero-point. The curve 1a is obtained for May 1942–April 1943, the curve 1b for May 1943 May 1944, the curve 1c for the complete period 1942–1944. In 1943 the radiality of stream from plages was disturbed, see plages at $L \approx 80°$ in (3). Correspondingly, we again obtain tw maxima and one minimum if the superposed epoch method is applied to plages in "favorable and in "unfavorable" hemispheres of the sun. *Subject Headings:* **1. Geomagnetic disturbance 2. Solar-geomagnetic relationships.**—*Author's abstract.* Ⓢ

12.10–194 550.382.

Hargraves, Robert B. (*Dept. of Geology, Univ. Witwatersrand, Johannesburg, S. Africa*) **Magnetic anisotropy and remanent magnetism in hemo-ilmenite from ore deposits at Allar Lake, Quebec.** *Journal of Geophysical Research*, Wash., D. C., 64(10):1565–1578, Oct. 195 9 figs., 5 tables, 15 refs. **DLC**—The anisotropism of magnetic susceptibility of nearly pu hemo-ilmenite ore from deposits in the Allard Lake area consists of a distinct plane of maximu susceptibility (defined by maximum and intermediate axes along which the susceptibility is similar magnitude) with a minimum susceptibility axis at right angles. This plane coincid with a preferred crystallographic grain-orientation indicated by the parallelism of titanhemati lamellae which have exsolved on the basal plane of the ferrianilmenite host grains. Measur ment of the remanent magnetism (RM) shows a striking tendency for the RM vectors to l in or near this preferred plane. On the assumption that hematite (if not ilmenite as well) potentially ferromagnetic in the basal plane only (paramagnetic parallel to the c-axis), it w inferred that the RM vectors could represent the resolved component of the magnetizing fie which tended to lie in the plane of maximum susceptibility. Under this hypothesis, it possible to resolve the broad spread shown by the RM vectors of samples from one deposit terms of a single magnetizing field direction. The variation of the intensity of RM of otherwi similar samples can also be explained on this basis. With one exception, the RM of 47 measure samples of hemo-ilmenite ore was reversely polarized (N-seeking pole up). Additional 'nation history' evidence bearing on the problem of selfreversal of thermo-remanent magnetism (TRM is provided by this study. *Subject Headings:* **1. Magnetic anisotropy 2. Remanent magnetis 3. Allard Lake, Quebec.**—*Author's abstract.*

12.10–195 551.506.22:550.381.

Kalashnikov, A. G. and Zybin, K. Iu., **Nekotorye rezul'taty nabliudeniĭ vektora variat gorizontal' noĭ sostavliaiushcheĭ geomagnitnogo polia (po nabliudeniiam MGG).** [Certa results of observations of the vector of the variations of the horizontal component of t geomagnetic field (according to IGY observations).] *Akademiia Nauk SSSR, Izvestiia, Se Geofizich.*, No. 2:236–242, Feb. **1960.** 8 figs., ref. Russian summary p. 236. **DLC.** Tran into English in the corresponding number of its *Bulletin of the Academy of Sciences, USS Geophysics Series*. **DLC**—The complete vector of the geomagnetic field is observed at t geophysical station "Borok" (58°02′N and 36°58′E) by means of the so called three-compone installation which records simultaneously the variation of the components, H_x, H_y and Z of t geomagnetic field. The records of Sept. 1958 were analyzed in order to determine the behavi

of the vector of variation of the horizontal component of the geomagnetic field as a function of time of day and to compare its behavior with the vector of the electric field. The analysis shows that the mean hourly values of the azimuth of the predominant direction of the vector of variation of the horizontal component of the geomagnetic field and the vector of variation of telluric currents obtained by different statistical methods differ from one another by an angle of 90°. The mean hourly values of the eastern azimuths of a large axis do not show 24-hr variation. This is additional proof of the fact that eastern azimuths are random with respect to the behavior of the vector at Borok. The selected characteristics of the behavior of the vector of variation of the horizontal components of the geomagnetic and geoelectric fields describe sufficiently clearly the behavior of the vector in time and space. The relationship of direction and amplitude of geomagnetic and geoelectric fields are closely connected. These relationships depend essentially upon geologic properties of the region of location of the station. The simplest explanation of the origin of horizontal vectors of variation of geomagnetic and geoelectric fields may be the presence of electrical vortices in the ionosphere. *Subject Headings:* **1. IGY magnetic observations 2. Ionospheric electrical vortices 3. Geomagnetic field variations 4. Geoelectric field variations.**—*I.L.D.* Ⓢ

D4. AURORAS

See also: **Orbital var. of satell. and rad. belts** (Bartels), 12.10–75.

12.10–196 551.594.5:535.33

†Arpigny, C. (*Astrophys. Inst., Liège Univ.*), **Les spectres des aurores polaires, 1, Identifications des émissions atomiques.** [Polar aurora spectrum, Pt. 1, Identification of atomic emissions.] *Société Royale des Sciences de Liège, Mémoires in −4°*, Ser. 1, 2(2/3):5–30, **1960.** 5 tables, 20 refs.—A critical study of the auroral identifications suggested hitherto by several observers and summing up of the present knowledges relating to these identifications. This study corroborated the presence of a certain number of multiplets. The author states a rather satisfactory agreement between his own results and those obtained by J. W. Chamberlain and N. I. Oliver, principally as regards *NI*, *OI* and also the forbidden lines; in the case of *NII* and *OII* a few multiplets do not appear in the tables inserted in the text. On the other hand, new multiplets are mentioned, but they must not be considered as new identifications recently discovered. They have been indicated because their relative intensities are not negligible with regard to those of the multiplets whose presence is well established, and the improvement of observations might eventually lead to placing certain of them into evidence in the auroral spectrum. *Subject Headings:* **1. Polar auroras 2. Auroral spectra 3. Auroral emissions.**—*A. V.* Ⓢ

12.10–197 551.594.5:551.521.67

Davis, L. R.; Berg, O. E. and Meredith, L. H. (*all, Naval Res. Lab., Wash., D. C.*), **Direct measurements of particle fluxes in and near auroras.** *International Space Science Symposium, Nice, Jan. 1960, Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 721–735. 11 figs., 2 tables, ref. Russian summary p. 721. **DWB** (523.1 I61sp)—Direct measurements of the particle fluxes, types and energies in an near visible auroras were made on four rocket flights at Fort Churchill, Canada, during the IGY. The results show that in both the rays and diffuse forms which were penetrated the auroral luminosity was primarily due to electrons (energies about 10 keV) incident on the upper atmosphere. The electron intensity was found to be roughly isotropic over the upper hemisphere. No electrons were detected outside aurorae: Protons, having energies up to a few hundred *keV*, were found on all flights both inside and outside aurorae. This paper presents details of the measurements and the experimental results. *Subject Headings:* **1. Auroral particle flux measurements 2. Proton measurements 3. Fort Churchill, Canada.**—*Authors' abstract.* Ⓢ

12.10–198 551.507.362.1:551.594.5:551.594.12

McIlwain, Carl E. (*State Univ. Iowa, Ia. City*), **Direct measurement of protons and electrons in visible aurorae.** *International Space Science Symposium, Nice, Jan. 1960, Space Research: Proceedings of the First Symposium.* Pub. **1960.** p. 715–720. 5 figs., 3 refs.

Russian summary p. 715. **DWB** (523.1 I61sp)—The nature of the particles which produc visible aurorae has been investigated with the aid of rocket borne scintillation detector Magnetic fields were used to separate the proton and electron components of the particle flu IGY rocket I16.26F was fired through a quiescent auroral glow of about intensity I. A tot energy flux of about 3 ergs/sec cm² sr and a flux of protons with greater than 70 keV energ above the atmosphere of 2.7×10^5 protons/sec cm² sr was measured. An H_β spectral lin intensity of about 6×10^7 quanta/sec cm² (column) in the vicinity of the rocket was measured b instruments on the ground. The dependence of the energy flux with variations in the associate magnetic field indicated that at least 60% of the energy flux was due to electrons. IGY rock I16.27F was fired through an active aurora of about intensity III. A total energy flux of up t 100 ergs/sec cm² sr was observed of which at least 90% was due to electrons. The flux protons with energies greater than 100 keV above the atmosphere was less than 10^4/sec cm² s No H_β spectral line was detectable during this flight. In both flights the flux of electrons wit energies above one MeV was less than 0.2 electrons/sec cm² sr. *Subject Headings:* **1. Visibl auroras 2. Auroral particle measurements 3. Rocket-borne scintillation detectors.**—*Author abstract.* Ⓢ

D5. VAN ALLEN BELTS

See: **Geophysical evidence bearing on orbital variations of satellites and on radiation belts** (Bartels), 12.10–75.

E. GENERAL GEOPHYSICS

See: **IGY and Czech. coop.,** 12.10–2; **Physics of Earth's interior** (Gutenberg), 12.10–9; **Gravity Program** (Wollard, Rose), 12.10–24; **Role of IUGG in advancement of geophysics** (Reichelderfer), 12.10–46; **IUGG** (Joyce), 12.10–47; **Spec. Comm. on Ant. Res.,** 12.10–57; **Antarc. symposium, Buenos Aires** (Weill), 12.10–58.

E1. SEISMOLOGY

See also: **Explosion project in Belgium** (Wéry), 12.10–125; **Seismic waves in the earthquake swarm during formation of Showa-Shinzan** (Kizawa), 12.10–202.

12.10–199 550.340.15 550.341.

Droste, Zofia; Gibowicz, S. and Hordejuk, J. (*all, Inst. Geophysics Polish Acad. Scie.*) **Analiz pervykh smeshcheniĭ seĭsmicheskoĭ volny na seĭsmogrammakh.** [Analysis of the fir movements of seismic waves recorded on seismograms.] *Acta Geophysica Polonica,* Warsa 7(2):136–164, **1959.** 21 figs., 7 refs., 30 eqs. English summary p. 157–164. **DWB, DLC**— The traces of amplitude values and periods of the first recorded movements of the seismic wa are as a rule strongly deformed by the instruments. Due to present lack of knowledge on t analytical shape of true ground movement, complete elimination of these deformations b computation is not possible. Nevertheless, assumptions concerning the first ground motio can be made. To simplify computation, the present paper assumes a sinusoidal form of t ground vibrations and on this basis, investigates the deformations in periods and first amp tudes caused by seismographs of different vibrations. The presentation is theoretical an extensively illustrated by graphical representations. *Subject Headings:* **1. Seismograph 2. Seismic waves.**—*I.S.*

12.10–200 550.340.1

Due Rojo, Antonio, **En el cincuentenario de la Estación Sismológica de Cartuja (190 1957).** [50th anniversary of the Cartuja Seismological Station, 1908–1957.] *Revista Geofísica,* Madrid, 17(65):83–88, Jan./March **1958. DWB**—R. P. Manuel M.ª—Sanche Navarro Neuman, S.J. was the first seismologist who, although working under technologic and economic difficulties, kept fine records. Improved techniques were introduced in 19 but in 1941 station facilities at Cartuja were expanded and increased with the aid of t United States Coast and Geodetic Service and the UCGI. *Subject Headings:* **1. Seismologic stations 2. Cartuja Seismological Station 3. Cartuja, Spain.**—*E.Z.S.*

12.10–201 550.340.69

†Gzovskii, M. V.: Krestnikov, V. N.; Nersesov, I. L. et al., **Novye printsipy seĭsmicheskogo raĭonirovaniia na primere tsentral'noĭ chasti Tian'-Shania, I.** [New principles in seismological classification, the central Tien Shan taken as an example, Pt. 1.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 2:177–194, Feb. **1960.** 8 figs. (2 fold.), table, 23 refs. **DLC.** Transl. into English in the corresponding number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The history of tectonic movements within the central Tien Shan, an area including the Kirghiz, Susamyr, Dzhumgol, Talass, At-Bashi, Fergana and part of the Kokshaal mountain ranges and the associated valley, is examined and maps showing the tectonics of the central part of the Tien Shan and alpine tectonic movements of this area are presented. The seismicity characteristics are discussed with the aid of maps showing intense earthquakes ($K \geqslant 12$), the epicenters of earthquakes for 1950–1956, and 1956–1958 diagrams of the position of areas for which graphs of earthquake frequency have been constructed, graphs of earthquake frequencies and the parameters of curves of earthquake frequencies. *Subject Headings:* **1. Tectonic movements 2. Earthquake frequencies 3. Seismological classification I. Tien Shan, U.S.S.R. I. Reĭsner, G. I.**—*I.L.D.*

12.10–202 551.21:550.341.2

†Kizawa, Takashi (*Met. Res. Inst., Tokyo*), **A study on the characteristics of the seismic waves in the earthquake swarm that occurred during the formation of Showa-Shinzan near volcano Usu and the mechanism of volcanic activity (A study of earthquakes in relation to volcanic activity, Pt. 2).** *Papers in Meteorology and Geophysics*, Tokyo, 9(3/4):204–239, Jan. 1959. 17 figs. (incl. photos), 4 tables, 35 refs., eqs. Japanese summary p. 238. **DWB**—Showa-Shinzan, a belonite-type new volcano, appeared in the S. W. part of Hokkaido and its appearance was accompanied by marked swarms of earthquakes. In the present report the author presents the results of his study on the basis of the seismograms (Figs. 3, 7, 15) recorded at three stations around the volcano: Muroran ($\Delta = 25$ km), Mori ($\Delta = 54$ km) and Sapporo ($\Delta = 69$ km). He was able to detect various new relationships between volcanic activity and earthquake swarms. The earthquake swarms are classified into A-type, B-type and C-type: 1) The A-type (Dec. 1943-May 1944) which preceded the eruption, had various amplitudes but as the time of eruption drew near the amplitudes diminished exponentially. The B-type, accompanying the formation of the lava dome, occurred as the eruption was over and lasted about a year with nearly the same amplitudes throughout the period. 2) The waves of the maximum amplitudes are fairly distinctly polarized—the ratio (An/Ae) of the maximum amplitudes of the two components of horizontal motion is $An/Ae > 1$ for the A-type, and reversely, $An/Ae < 1$ for the B-type. 3) During the early stage of volcanic activity (Dec. 28, 1943–Jan. 30, 1944), the principal 10 earthquakes of A-type distinctly showed the initial motions of P-waves. 4) Two phases which have strikingly slow group velocities were recognized. The tendency is particularly marked in the B-type. The two phases are tentatively named the third and the fourth phase. The velocity of the former appears to be less than 1 km/sec and that of the latter 340 m/sec. The third is an airy phase, whereas the fourth has the characteristics of an air-coupled Rayleigh wave. 5) The mode of variation of the amplitude ratio between the two phases suggests a difference in the depths of the hypocenters. *Subject Headings:* **1. Earthquake-volcanic activity relationships 2. Seismic waves 3. Showa-shinzan Volcano, Hokkaido, Japan.**—*From author's abstract.*

12.10–203 550.341.4

Gliyenko, E. V., **Ob opredelenii prelomliaiushcheĭ granitsy po dannym azimutal'noĭ stantsii.** [Locating the refracting boundary by azimuthal station records.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 3:475–481, March **1960.** 4 figs., 4 refs. **DLC.** Transl. into English in the corresponding number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—The determination of the position of refracting boundaries on the basis of data of recordings of local earthquakes by an azimuthal station which consists of several instruments situated at one point; the same phase of an approaching earthquake is recorded on several projections. Such an arrangement enables the determination of the directions of soil displacements and the direction of longitudinal waves. The method is based upon the establishment of an azimuthal station on the plane of the earth and the existence beneath it of a plane

inclined boundary of separation such that velocity V_1 in the upper layer is less than the velocit V_2 in the lower layer. A family of seismic rays located in the lower medium, each of which wa refracted at the separation boundary and arrives at the azimuthal station, was examined. TH direction of the seismic rays in space is characterized by α and the angle of issue by i. TH angular density of the rays is given by the function $\varphi(\alpha,i) = k \cdot \lim \varphi A \cdots \Delta\alpha \to 0$ and $\Delta i \to$ and k is chosen so that $\int_{\alpha=0}^{\pi}\int_{-\pi}^{\pi} \varphi(\alpha,i)d\alpha di = 1$. In accordance with the form of the functio $\varphi_1(\alpha,i)$ and $\varphi_2(\alpha,i)$ the inclination of the plane of the separation boundary and the ratio $V_1/$ are determined. Assuming that $\varphi_2(\alpha,i)$ is nowhere transformed into zero, $\varphi_1(\alpha,i)$ is equal zero outside a circular zone Q of complete internal reflection of the refracting boundary an not equal to zero within the cone. The axis of the cone is normal to the refracting boundar and the angle β_1 between its axis and the reflecting boundaries forming it is such that $V_1/$ $= \sin\beta_0$. The χ^2 criterion is used to determine whether the function $\varphi(\alpha,i)$ corresponds observations of a large number of rays: $\chi^2 = \sum_1^r \frac{\gamma_i^2}{np_i} - n$ where $p_i = \int_{Si} \varphi(\alpha,i)d\alpha di$. TH determination of the parameters of refracting boundaries is described and actual angles determinations of the boundaries according to data of the Garnisic station expedition a presented. *Subject Headings:* **1. Earthquakes 2. Seismic waves.**—*I.L.D.*

12.10–204 550.341.6:551.

Dix, C. H. (*Calif. Inst. of Tech., Calif.*), **The reflected seismic pulse.** *Journal of Ge physical Research*, Wash., D. C., 66(1):227–233, Jan. **1961.** 3 figs., 4 refs., 28 eqs. **DLC**—T theory originally due to CAGNIARD is recast in a form that makes the approximate numeri calculation of the shape of the reflected pulse simple. A new set of potentials is introduc from which the displacement components can be calculated by differentiations that are easier perform than those with the usual scalar and vector potentials. We use four potentials, t for the vertical components and two for the horizontal components of displacement, T irrotational and rotational vertical-displacement components are found by differentiation the potentials with respect to time. The horizontal-displacement contributions are derived a single horizontal differentiation. For the rotational parts the number of differentiations reduced from two to one. The time differentiation is much easier to carry out than the spa differentiations for the forms used in the present paper. A numerical example, selected throw some light on the problem of securing reflections from the Mohorovicic 'discontinuity worked out. The variation of shape and strength of the reflection with time and with distan from source to receiver is studied in the example. *Subject Headings:* **1. Seismological theor 2. Mohorovicic discontinuity.**—*Author's abstract.*

12.10–205 550.34

Northrop, John; Blaik, Maurice and Tolstoy, Ivan (*all, Columbia Univ., Hudson La Dobbs Ferry, N. Y.*), **Spectrum analysis of T-phases from the Agadir earthquake Feb. 29, 19 23h 40m 12s GCT, 30°N, 9°W (USCGS).** *Journal of Geophysical Research*, Wash., D. 65(12):4223–4224, Dec. **1960.** fig., 9 refs. **DLC**—T-phases from the Agadir earthquake Feb. 29, 1960 were recorded from several SOFAR-type bottomed geophones. The recordi were then examined with spectrum analysis equipment of a few cps resolution. Tracings this T-phase arrival at three of the receivers are shown. From a detailed study of the spectr of T-phases, it may be possible to determine some of the parameters of the travel path, sediment thickness and velocity, holes in the mid-Atlantic ridge that have passed T-p energy, and refraction of rays toward the lower velocity northern water paths. MILNE (19 pointed out that frequency analysis of T-phases may provide a way to distinguish ato blasts from earthquakes. *Subject Headings:* **1. Spectrum analysis of T-phase 2. Earthqu Agadir (Feb. 29, 1960) 3. Earthquake detection 4. Atomic blast detection.**—*E.Z.S.*

12.10–206 551.242:53

Sato, Y; Landisman, M. and Ewing, M. (*all, Lamont Geological Obs., Columbia Un* **Love waves in a heterogeneous, spherical earth, Pt. 1, Theoretical periods for the fundame**

d higher torsional modes. *Journal of Geophysical Research*, Wash., D. C., 65(8):2395–2398, g. 1960. fig., table, 15 refs. **Pt. 2, Theoretical phase and group velocities.** *Ibid.*, 65(8): 99–2404, Aug. 1960. 4 figs., table, 23 refs. **DLC**—Pt. I—Free periods of torsional oscilla- on have been calculated for the Jeffreys-Bullen and Lehmann I earth models. Results are ven for the first nine radial modes and for azimuthal modes up to $n=44$. The calculation lows for sphericity, an arbitrary number of discontinuities, gradients within each shell, and liquid core. Pt. II—Love wave phase and group velocities have been calculated for the first radial modes for the Jeffreys-Bullen and Lehmann I models. Sphericity, an arbitrary umber of discontinuities, gradients within each shell, and a liquid core have been taken into count. A new result is the prediction of maximum values of group velocity of about 7.5 n/sec for all the higher modes and the relation of these maxima and the period cutoffs to avel-time results. *Subject Headings:* **1. Earth models 2. Love waves.**—*Authors' abstracts.*

12.10–207 550.342

Metzger, J. (*Centre de Géophysique de M'Bour, Sénégal*), **Apparitions de microséismes bservées sur la côte Ouest-Africaine.** [Microseisms occurrences observed on the West- frican coast.] *Annales de Géophysique*, Paris, 16 (4):565–567, Oct./Dec. 1960. 3 figs., 2 refs. rench, English and Russian summaries p. 565. **DLC**—This note reports some preliminary bservations relating to the appearance of local microseisms and their relationship with mete- rological disturbances. This study was made at the Geophysical Center at M'Bour, on the tlantic coast 80 km to the S.E. of Dakar. The M'Bour Observatory often registers micro- ismic storms with sudden beginning and short periods (0.5 to 2 sec), they are correlated with ualls, the path of which is nearly perpendicular to the coast. The microseisms originate in allow water and may be due to short waves generated by gusts. *Subject Headings:* **1. Micro- ismic observations 2. Microseismic storms 3. M'Bour, Senegal.**—*A.V.*

F. OCEANOGRAPHY, HYDROLOGY AND GLACIOLOGY

F1. OCEANOGRAPHY

See also: **Temp. of surface layer of sea** (Laevastu), 12.10–25; **Oceanic obs. of Pacific** (Reid, *ed.*), 12.10–26; **Admiralty list of radio signals,** 12.10–30; **Searchers of the sea** (Daugherty), 12.10–34; **Trial wave forecasting** (Koido, Hanzawa), 12.10–351; **Storm surge forecasts, German North Sea Coast** (Tomczak), 12.10–353.

12.10–208 551.546:681.14:621.38

Fofonoff, N. P. and Froese, C., **Programs for oceanographic computations and data rocessing on the electronic digital computer ALWAC III-E, M-1 miscellaneous programs. anada.** *Fisheries Research Board, Manuscript Report Series (Oceanographic and Limnological)*, o. 72, June 17, 1960. 35 p. figs., forms. On t-p.: Programmed by the Canadian Committee n Oceanography. **DWB** (551.46 C212ma)—This publication describes a variety of programs ritten for the automatic computer, ALWAC III-E, at the University of British Columbia. he programs are entitled: 1) Salinometer tables, 2) Classification of daily seawater data, Tide program, 4) Program for stability and potential energy parameters and 5) Mass trans- rt from atmospheric pressure data. *Subject Headings:* **1. Oceanographic data processing Electronic computer programs.**—*I.S.*

12.10–209 551.463:534.24

Garrison, G. R.; Murphy, S. R. and Potter, D. S. (*all, Applied Physics Lab., Univ. of Vash., Seattle*), **Measurements of the backscattering of underwater sound from the sea surface.** *coustical Society of America, Journal*, 32(1):104–111, Jan. 1960. 15 figs., 11 foot-refs., eqs. **DLC**—Measurements of the backscattering of 60-kc sound from the surface of the a have been made in Puget Sound in an effort to relate the strength of the scattered sound o the character of the surface. In addition to providing a means of predicting reverberation vels, an attempt has been made to obtain a better understanding of the fundamental mecha-

nism of scattering at the air-water boundary. The reverberation measurements are present along with observations of several oceanographic and meteorological parameters. An exami tion of the data allows the following conclusions: (1) reverberation pulses from an area of seve square yards follow a Rayleigh distribution; (2) reverberation cannot be directly related to wave height, but is closely correlated with wind speed; (3) reverberation increases with w speed to a speed of 14 knots, and remains constant for higher wind speeds; and (4) reverberat is independent of the angle with the surface for angles from 20 to 60 degrees, but drops rapidly as the angle is decreased below 20 degrees. *Subject Headings:* **1. Sound scatter mechanics 2. Sound transmission in sea water 3. Puget Sound, Wash.**—*Authors' abstra*

12.10–210 537.531:551.46

Hicks, B. L.; Knable, N.; Kovaly, J. J. et al., **The spectrum of X-band radiation ba scattered from the sea surface.** *Journal of Geophysical Research*, Wash., D. C., 65(3):825–8 March **1960.** 5 figs., table, 10 refs., 3 eqs. **DLC**—A coherent radar was used to measure "sea clutter" or backscattering of X-band electromagnetic energy from the sea surface. M than 200 recorded samples of clutter were analyzed to give power spectra of the clutter. E spectrum was displayed as a function of frequency and of position on the water surface and also averaged to give the mean spectrum of patches 3750 ft long. Five of the samples sho an anomalous downwind displacement of the clutter by as much as 7 knots. The displ indicate again, as in earlier Control Systems Laboratory measurements, that the upwind e of the clutter spectrum is smooth for all wind speeds observed, but that the downwind edge, sea state 3 or above, is broadened in an irregular fashion as a function of range. This irregu broadening implies a considerable variability, from patch to patch, in the downwind side of probability distribution of velocity of scatterers on the sea surface. The width at half-po of a mean spectrum is proportional, for reasonable assumptions, to the width at half-maxim of the probability distribution of scatterer velocities. The variation of the latter width, with sea state can be represented by the equation (expressed in consistent units) $\Delta_0 = 11H_{\frac{1}{3}}$ where the numerical factor is dimensionless, $H_{\frac{1}{3}}$ is the significant wave height, and T_m is period corresponding to the maximum of the energy spectrum for the water waves themsel when this spectrum is plotted as a function of frequency. This equation fits the experime data within about 10 per cent for bandwidths in the range of 2 to 5 knots (64 to 160 cps) wind speeds in the range of 8 to 19 knots. The bandwidth of the clutter is found to be appr mately proportional to the wind speed. The relationships of clutter bandwidths to wave whitecap velocities, radar depression angle, and wind direction are also discussed. *Sub Headings:* **1. Radiation back scattering from sea surface 2. "Sea clutter." I. Newell, G II. Ruina, J. P. III. Sherwin, C. W.**—*Authors' abstract.*

12.10–211 525.63:551.465:532.52(28

Abbott, M. R. (*Hydraulics Res. Station, Wallingford, Berkshire, Eng.*), **Boundary la effects in estuaries.** *Journal of Marine Research*, New Haven, Conn., 18(2):83–100, Oct. 19 7 figs., 4 refs., 37 eqs. **DWB, DLC**—This paper is concerned with the velocity in the bound layer of an estuary during a tidal cycle; the estuary considered has negligible salinity eff The problem reduces to solving the usual non-steady boundary layer equations if it is assu that (a) flow is two-dimensional with a horizontal bed at any cross-section, and (b) li variation in breadth of the estuary in the boundary layer region. Further, the eddy visco is considered constant; thus the boundary layer equations are the same as those for a lam layer except that they have an enhanced coefficient of viscosity due to turbulence. surface or main stream velocity is assumed sinusoidal in time, though the amplitude phase lag at any point can be specified arbitrarily. The boundary layer equations are so by a method of successive approximation. The first approximation for the longitud velocity contributes periodic terms with the frequency of the tidal motion but with attenua amplitude and phase advance near the bed. The second approximation gives, in additio periodic terms having twice the frequency of the tidal motion, a steady term which is non- even outside the boundary layer. This means velocity is of importance near the bed du its influence on the movement of loose bed material. A simple criterion is given for direction of mean velocity at a point just above the bed; for the Thames this agrees with

rvation. The theory is applied in detail to the Thames Estuary, and results compare tisfactorily with observations in spite of the assumptions in the theory. *Subject Headings:* **Boundary layer effects in estuaries 2. Estuarine circulation 3. Thames Estuary, Eng.**—*Author's abstract.*

12.10–212 551.583.3:551.526.6:551.464

†Robinson, Margaret K. (*Univ. California*), **Statistical evidence indicating no long-term limatic change in the deep waters of the North and South Pacific Oceans.** *Journal of Geophysical Research*, Wash., D. C., 65(7):2097–2116, July 1960. 16 figs., 5 tables, 29 refs. **DLC**—No inference of climatic change appears to be warranted from an analysis of temperature nd salinity values below 100 m at 189 oceanographic stations in the North and South Pacific ceans. Data collected in the period 1929–1932 by the Carnegie, Dana, Scoresby, Discovery , and International Fisheries expeditions were used as reference stations. The reference tations were paired with data collected between 1824 and 1958. Fifty % of the stations were ithin 60 naut mi of their reference stations, 30% were between 60 and 120 naut mi, and 20% ere between 120 and 568 naut mi. The stations that were more than 120 naut mi from their ference stations were included in order to obtain additional deep-station values, but they were nited to the same water mass as the reference stations. The analysis showed large random dividual differences in both fields down to 1000 m, and smaller but significant anomalies in veral instances between 1000 and 5000 m. For the data grouped by years or by water mass, attered significant differences were observed at all levels and in all groups. Much larger mples are needed to separate statistically the short-period variability and the instrumental, ocessing, and interpolation errors from long-period change in deep waters. *Subject Headings:* **Climatic changes in oceans 2. Sea water temperatures 3. Pacific Ocean.**—*Author's stract.*

12.10–213 551.506.22:551.461.2(266)

Pattullo, June G. (*Oregon State College*), **Seasonal variation in sea level in the Pacific Ocean uring the International Geophysical Year, 1957–1958.** *Journal of Marine Research*, New aven, Conn., 18(3):168–184, Nov. 30, 1960. 7 figs., table, 5 refs. **DWB, DLC**—Seasonal ariations in sea level derived from IGY measurements are described and compared with those reviously published. These measurements confirm the earlier descriptions, which were based n observations from gauges attached mostly to continental coastlines. That is, in low titudes in each hemisphere, sea level is high at the end of summer. There is a zonal band of igh sea level from about the Equator to 40°N in Sept. while in comparable southern latitudes ea level is low. Furthermore, north of 40°N there is a distinct change of phase; sea levels all round the Gulf of Alaska and the Aleutians are highest in December. The following new nformation has resulted from the improved distribution of samples. First, sea level variations n the South Pacific are measurably smaller than those in the North Pacific. Second, the easonal variation is appreciably larger near the continents than in the central oceanic regions f the northern hemisphere; this effect is virtually absent in the southern hemisphere. Finally, he Dec. maxima found earlier in the Gulf of Alaska are now known to be far more widely istributed than previously thought. In Dec., sea level is high from Bering Strait south to the entral South Pacific and low nearer the coasts from Mexico to Chile and from southern apan to Australia. Similar contours, but of opposite sign, appear in June. *Subject Headings:* **. Sea level variations 2. IGY oceanography program 3. Pacific Ocean.**—*Author's abstract.*

12.10–214 535.241:551.463

Tyler, J. E. (*Scripps Inst. of Oceanog., Univ. Calif.*), **Observed and computed path radiance n the underwater light field.** *Journal of Marine Research*, New Haven, Conn., 18(3):157–167, Nov. 30, 1960. 5 figs., 11 refs., 8 eqs. **DWB, DLC**—This paper presents experimental data n changes in underwater radiance in zenith and nadir directions as a function of depth for oth overcast and clear sunny lighting conditions at the surface. The equation developed by 'REISENDORFER (1957) to describe path radiance along any path is then used to predict bserved changes, and predicted results are compared with the observed data. *Subject Heading:* **1. Underwater radiance.**—*Author's abstract.*

12.10–215 551.465(265/2

Knauss, John A. (*Scripps Inst. of Oceanog., Univ. Calif.*), **The structure of the Pac equatorial countercurrent.** *Journal of Geophysical Research*, Wash., D. C., 66(1):143–1 Jan. 1961. 9 figs., 4 tables, 25 refs. **DLC**—The Pacific equatorial counter-current flows fr west to east across the entire Pacific, a few hundred miles north of the equator. The veloc structure of this current in the eastern Pacific has been studied on three cruises during period 1955–1959; in this paper the results of the work are summarized. (1) The most unus observation concerns the variation in transport. In August 1958 the transport was in exc of 60×10^6 m³/sec. Eleven months later it was nearly zero. (2) Direct current measureme indicate that the current is in approximate geostrophic balance. (3) There is some indicat of an Ekman drift current superimposed on the geostrophic current at the surface. (4) Th is considerable day-to-day variation in the surface current. The mean speed of the surf current (in the region studied) increases to the east and the rms variation of the surface creases as the mean speed increases. *Subject Headings:* **1. Pacific equatorial countercurr 2. Ocean currents 3. Pacific Ocean.**—*Author's abstract.*

F2. HYDROLOGY

See also: **Morphology and hydrology of rivers** (Rzhanitsyn), 12.10–21; **Use of atmos. circulation indices in forecasting water levels, Carpathian rivers** (Ogievskaia), 12.10–387; **Forecasting summer-autumn discharge of Transcaucasian rivers** (Vazhnov), 12.10–390.

12.10–216 551.579:628.1(

Balchin, W. G. V., **Water resources in the United States.** *Nature*, London, 187(473 562–564, Aug. 13, 1960. **DWB**—Rise in population in the U. S. puts great demands on wa resources. According to a report, by a Select Committee on National Water Resources U. S. is now consuming 250 thousand million gallons of fresh water a day and this figure increase to 600 thousand million gallons by 1980. The development of hydroelectric powe dependent on water resources. *Subject Headings:* **1. Water resources 2. United Sta** —*A.H.K.*

12.10–217 551.579.4:551.482.2(282.2

Grishin, I. S., **Vysokiĭ pavodok na Nemane.** [High flood on the Neman.] *Prira* Moscow, No. 11:98–100, Nov. 1959. 3 figs. **DLC**—The largest flood in 150 years occur in the basin of the Neman River in the spring of 1958. It was the result of very high moisture in the summer-fall months due to high and uneven rainfall distribution and extens winter snowfall. At the time of snowmelt the water content of snow was 2.0 to 2.5 times normal. The accumulation of snow was also caused by the relatively protracted winter peri The positions of moraine elevations and ridges influenced the snow accumulation. The sn accumulation at the end of winter, within the boundaries of the Baltic moraine ridges and Lithuanian-White Russian elevation, reached 150–190 mm as compared with 50–100 mm in plains. The winter of 1957–58 in the Baltic region was characterized by very unstable weat Short period cooling alternated repeatedly with considerable warming-up. This was par ularly true in February. In contrast to the fall-winter period, the spring snowmelt occur during anticyclonic weather, which was characterized by a return of cold weather and li precipitation. Warm days were rare and negative temperatures prevailed at night. snowmelt was protracted and discontinuous. During the spring of 1958 the rainfall abnormally low. The rise of water level on the rivers was gradual during the first da snowmelt but was more rapid toward the end of snowmelt. The accumulation of a large m of water during a comparatively gradual development of the normal spring processes, cau the washing away of ice blocks in parts of the river so that the river opened up and the melt proceeded to the crest of the flood; hence the water level was reduced during the fl period. In the unobstructed channel the flood peak was tempestuous so that very high wa levels were attained. *Subject Headings:* **1. Flood, Neman River (1958) 2. Neman Ri** —*I.L.D.*

12.10–218 551.579.4

Kalinin, G. P. and Makarova, T. T., **Issledovanie nekotorykh voprosov stoka vesennego polovod'ia.** [Investigation of certain problems of spring flood discharge.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 94:37–47, **1959.** 4 figs., 3 tables, 2 charts, 3 refs., 4 eqs. **DWB**—Using experimental data on the process of infiltration obtained at the Valdai Scientific Hydrological Laboratory and hydrological data for a field and forested area (snow cover, precipitation, water yield of snow, etc.), the authors attempted to compute by means of the method of water balance the variations of losses of melt water runoff with time during the period of high water. The calculation equation is written in the form $p = x - y_0 \pm \Delta W_{\text{ret}}$ where p = runoff loss during the period of time being considered, x = amount of water formed from snow and liquid precipitation, y_0 = runoff layer during the same period and W = variation of water supply at the surface of the basin. With the aid of data presented in an appendix, runoff loss, p, is calculated; and it is shown that loss of runoff by infiltration decreases with time and that part of the infiltrated water flows in the spring high water. With the aid of the expression $W = \sum_{i=1}^{i=t} y_{\text{und}}$ giving the curve of amount of supplies of underground water a more accurate expression for losses by infiltration, namely $p = x_n - y_{\text{surf}} \pm \Delta W_{\text{ret}}$. Furthermore, the relationship between the coefficients of filtration in frozen and thawed (K_f, K) soil and soil moisture is expressed in the first approximation by $K_f = Ke^{-2\beta\beta}$ where K = filtration coefficient of impermeable soil, β = moisture of frozen soil at the beginning of the experiment (in %). Graphs showing the variation of runoff losses with time, the dependence of time of run of water upon the snow cover of a basin and air temperature, the dependence of runoff upon moisture supply of a water basin and snow cover and data giving the filtration coefficients of frozen and thawed soils and their ratios, etc. are presented. *Subject Headings:* **1. Spring flood discharge 2. Runoff rates 3. Infiltration data 4. Valdai, Novgorod Region, U.S.S.R.**—*I.L.D.*

12.10–219 551.577.32:551.579.4(282.252)

Peking. Univ. [Faculty] of Geophysics, **Estimation of the maximum monthly mean stream flow of Changkiang at Ichang.** *Peking. Univ., Journal (Acta Scientiarum Naturalium Universitatis Pekinensis)*, No. 1:67–70, **1959.** 4 figs., ref. In Chinese; English summary p. 68. **DLC**—This paper aims at calculating the maximum monthly mean flow of the Changkiang at Ichang from meteorological elements. The average monthly mean precipitation of Ichang and Chungking and its correlation coefficient with the monthly mean flow at Ichang are calculated, and a regression equation is established. Empirical and theoretical curves of the frequency distribution of the average monthly mean precipitation are found. The maximum monthly mean stream flow may be calculated by the value read from the theoretical curve and the regression equation. *Subject Headings:* **1. Precipitation-runoff relationships 2. Stream flow variations 3. Changkiang River, China.**—*Author's abstract.*

12.10–220 551.579.4:551.482.215.2

Tada, Fumio, **On the velocity of the transmission of the flood wave.** *Journal of Geography*, Tokyo, 58(6/7):198–203, **1949.** 3 figs., 3 tables. In Japanese. English summary p. 203. **DLC** (Orientalia)—Mean velocity of the river flow is proportional to the depth of the water and the slope of the water surface. It is said that the velocity is greater at the upper course with steeper slope than at the lower course with more gentle slope in the normal low water level. In the case of the flood of the Kitakami River in 1948, however, the author examined the velocity of the transmission of the flood wave, finding that it is slower at the steeper slope in mountains and canyons than that of the lower flood plains. The reason for the decrease of velocity in the flood flow in mountains has been found to be the result of the increase in the content of gravel and sand in the flood water. *Subject Headings:* **1. Flood wave velocity 2. Kitakami River, Japan.**—*Author's abstract.*

12.10–221 551.501:551.579.5

†Holmes, R. M. and Robertson, G. W., **A modulated soil moisture budget.** *Monthly Weather Review*, Wash., D. C., 87(3):101–106, March **1959.** 5 figs., 2 tables, 24 refs. **DLC.**

Discussion by M. A. Kohler and the authors, *Ibid.*, p. 106.—Various methods for determinin soil moisture budgets by meteorological methods are reviewed critically and the require characteristics for a useful scheme of budgeting or control of soil moisture by such method are stated. The soil moisture budget described by the authors is based upon the followin assumptions: (1) all moisture from the zone of "complete depletion" undergoes evapotrans piration at a potential rate; (2) potential evaporation (PE) is modulated so that moisture i the "transitional zone" is withdrawn at a decreasing rate depending upon the percentage c available moisture remaining; (3) available moisture is withdrawn from the topmost layer c the soil, before extraction occurs from lower layers; (4) rainfall occurring after a dry spell i evapotranspired at the potential rate until it has been depleted unless it percolates into th "transitional zone"; then PE is modulated and withdrawal proceeds at a slower rate; an (5) percolation is regarded as complete. The individual operations of the technique ar presented and the soil moisture losses by a grass-legumesward calculated by the commo budget technique and modulated budget technique are compared. The results show that th mean monthly moisture deficit of the soil is more significantly correlated with wheat yiel when it is devised by application of a budget that considers moisture and variable root zon In the discussion KOHLER questions the reality of the high correlation found (0.68) in view c the assumed linear effect of mean monthly deficiency. Also the modulated budget is simila in important respects to that employed by the Weather Bureau in connection with rive forecasting. The conclusions that evaporation pans are cumbersome and disadvantageou holds only for the 4-ft sunken pan used in Canada but not for the Class A pan used in th U. S. Weather Bureau. The authors in reply affirm their statement on the disadvantage c pans generally and state that they were unaware of the use of a modulated technique in th U. S. Weather Bureau. They maintain that for conditions of level flat land there exists saturation point. *Subject Heading:* **1. Soil moisture budget determination.**—*I.L.D.*

12.10–222 551.579.5 :631.5

Iovenko, N. G., **Rezul'taty izucheniia gidrometeorologicheskogo rezhima pochvy i pr zemnogo sloia vozdukha v sviazi s novoĭ sistemoĭ obrabotki.** [Results of studies of th hydrometeorological regime of soil and the air layer near the ground in relation to the ne system of tillage.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institu Trudy*, No. 16:63-68, **1959. DWB**—The results of experimental studies on the effect c ordinary ploughing, mold board ploughing and disc ploughing upon the hydrometeorologica regime of the soil are presented. In soil with a sandy mechanical structure (primarily pea podzol) and with a high natural permeability deep mold board ploughing accompanied b considerable rainfall causes the water to percolate deeper than the root zone so that wate is lost to the plants. In soils with the mechanical structure of clay (chernozem) and with lo permeability deep mold board ploughing in the presence of considerable moisture favors a larg accumulation of moisture in the deep layers (70–150 cm). During dry periods when so moisture is close to the wilting coefficient and atmospheric moisture is low deep, mold boar ploughing favors more intensive drying of the soil. Moisture losses increase the number c weeds which develop more actively with variations of mold board ploughing. The surfac cultivation of soil generally affects unfavorably the accumulation of moisture on all types c soil (except soils of sandy mechanical structure) in comparison with deep mold board ploughin The difference between the temperature regime of the soil and the atmospheric layer near th ground varied in most instances within tenths of a degree and rarely exceeded 2°C. The yie on soils subjected to mold board ploughing was generally less than on soil cultivated in th usual manner. *Subject Headings:* **1. Hydrometeorological regime of soil 2. Soil structu influences on moisture 3. Tillage effects on hydrometeorological regime of soil.**—*I.L.D.*

12.10–223 551.525.2 :551.579.5 :631.6

Pletser, Jańos, **Öntözött talaj hömérséklete.** [Temperature of irrigated soil.] *Időjárá* Budapest, 64(2):113–114, March/April **1960.** table, 3 refs. **DLC**—Observations of so humidity and temperature relationships made in Martonvásár in September of 1958 and 19 are described. Experiments demonstrated the effect of humidity on the heat conductivi of the soil. The soil temperature at 2 cm depth was up to 5°C higher in irrigated parcels tha in nonirrigated ones. On the contrary, the soil temperature of dry parcels was 3–4°C high

t 2 and 5 cm depth than that of irrigated ones, while at 10 and 20 cm depth the temperature of he irrigated parcel was 2°C higher, due to the fact that the heat conductivity of the upper soil trata had been increased by irrigation. The humidity content of dry and irrigated soil in proportion to weight of the dry soil is shown in a table. *Subject Headings:* **1. Soil moisture effects 2. Soil temperatures 3. Irrigation effects on soil temperature.**—*O.T.*

F3. GLACIOLOGY

12.10–224 551.324:551.506.22(99)

Hollin, J. T. and Cameron, R. L. (*both, Inst. of Polar Studies, Ohio State Univ.*), **I.G.Y. glaciological works at Wilkes Station, Antarctica.** *Journal of Glaciology*, London, 3(29):833–43, March 1961. 6 figs., 16 refs. French and German summaries p. 833. **DWB, DLC**—The Wilkes Station area comprises 75 km² of rock which form one of the most extensive exposures on this part of the East Antarctic coast. During 1957 and 1958 the continental ice sheet southeast of Wilkes Station was explored to a distance of 100 km inland, and its form and behavior studied by means of topographic, movement and gravity surveys. Surface stake measurements inland showed a net accumulation equivalent to 13.7 cm of water in 1958. Sub-surface measurements of wetness, hardness, density, grain size, crystal size, shape and fabric and electrical conductivity were made at 50 locations and to depths which reached 62 m at an auxiliary inland station. Meteorological observations were made and englacial temperatures measured. In summary, the ice sheet in this area provides a typical section of a polar glacier. The evidence for glacial fluctuations and the possibility of establishing a chronology for these are discussed. *Subject Headings:* **1. IGY glaciology program 2. Wilkes Station, Antarctica.**—*Authors' abstract.*

12.10–225 551.311.1:778.38(711) 551.324.433

*Haumann, Dieter (*Natl. Res. Council, Ottawa*), **Photogrammetric and glaciological studies of Salmon Glacier.** *Arctic*, Montreal, 13(2):75–110, June 1960. 18 figs., 14 tables, 17 refs., 23 eqs. **DLC**—The methods used to establish a ground control network and to carry out the field work necessary for the aerial photogrammetric survey for the second expedition of the University of Toronto to the Salmon Glacier region in British Columbia are presented. The expedition area, the field survey, the photogrammetric operations and their evaluation are described. A comprehensive analysis of the behavior of the glacier, based on the study of accurate mapping together with meteorological observations, is presented. A special map of the area, scale of 1:25,000, produced from aerial photographs taken from a relative flying height of 2200 to 3000 m is attached. Fluctuations in glaciations since the last advance, approximately during 1820–1860, were reconstructed by a study of vegetation. Plots prepared on aerial photographs taken in 1949 were compared with those of 1957, and indicated ice losses accurately. Recommendations are presented for the most satisfactory aerial photogrammetry as well as for precise instruments for plotting. The illustrations include, besides the various photographs, maps of the area, a sketch of the method of establishing velocity profiles by terrestrial photogrammetry and velocity profiles. Derivation of formulas for calculating height losses and on the derivation of error in length at intersection, and a survey of the triangulation net are given. Tables include data related to the flights, velocity base lines and rate of ablation. *Subject Headings:* **1. Glacier photography 2. Glacier variations 3. Aerial photography of glaciers 4. Salmon Glacier, British Columbia.**—*O.T.*

12:10–226 551.324.433:551.506.22(99:42)

Smith, Jeremy (*Falkland Islands Dependencies Survey, Dept. of Geology, Univ. of Birmingham*), **Glacier problems in South Georgia.** *Journal of Glaciology*, London, 3(28):705–714, Oct. 1960. 8 figs., 4 tables, 15 refs., eq. **DWB, DLC**—This paper is a synopsis of *Falkland Islands Dependencies Survey Scientific Report*, No. 29. Glaciological and climatic investigations carried out in South Georgia during the IGY are described. The budgets of the Hodges and Hamberg Glaciers for 1957–58 are given and discussed in relation to climatic factors. Temperature measurements indicate that the Hodges Glacier, and probably all ice in South Georgia below an altitude of 1,000 m, is geophysically temperate. The fluctuations of South

Georgian glaciers during relatively recent times are briefly discussed. *Subject Heading* **1. Glaciological observations 2. IGY glaciology program 3. Falkland Islands.**—*Author abstract.*

12.10–227 551.578.462:551.324.433:551.579.2:551.482.2(234.

Tsomaia, V. Sh. and Kisin, I. M., **Nekotorye itogi issledovaniia poverkhnostnogo taiani lednikov Kavkaza.** [Some results of a study of surface melting of the Caucasus glaciers *Meteorologiia i Gidrologiia*, Moscow, No. 4:36–38, April **1960.** 4 figs., 5 refs. **DWB, DLC** The results of observation on ablation of the Addala-Shukhgel', Bogoss and Kazbegi glacie made by the Azerbaidzhan and Georgian Hydrometeorological Services are examined. Abl tion was measured by means of rods and by the melt surface runoff. The results of dai measurements show that on the average the magnitude of ablation amounted to 0.65 cm p 1°C of positive mean daily air temperature. A close relationship exists between ice melti for a decade and the corresponding mean decadal air temperature; the differences in melti for July, August and September are explained by the variation in ice viscosity; in July t less dense ice melts and in August and September there begins to melt the lower densest ic A similar variation in the melting period is observed in the case of snow and firn. The reliabili of the relationship is confirmed by the relationship of river runoff with amount of melti calculated from mean decadal air temperature. The results of observations show that t usual amount of melting diminishes with increase in height. Only on individual sections of t glaciers of the southern and northern Caucasus does melting not diminish with height. Grap showing the variation of meteorological elements and ablation, the dependence of decad melting on mean decadal air temperature and of mean decadal water discharge for vario rivers, etc., are presented. *Subject Headings:* **1. Glacial ablation 2. Snow cover ablati 3. Caucasus, U.S.S.R.**—*I.L.D.*

12.10–228 551.324.433:551.506.11:551.461.2(9

†Wexler, Harry (*U. S. Weather Bureau*), **Ice budgets for Antarctica and changes in sea lev** *Journal of Glaciology*, London, 3(29):867–872, March **1961.** 4 tables, 31 refs. French a German summaries p. 867. **DWB, DLC**—Eight different ice budgets for the Antarctic I Sheet are examined. Five of these budgets call for rates of increase of the ice which are surprisingly good agreement considering the wide dispersion of individual components of t budgets. The observed rise in sea-level of the world's oceans would appear to contradict t removal of water required to nourish the Antarctic Ice Sheet at the claimed rates. T thermal expansion of oceanic columns, caused by "climatic" warming of the oceans, has be invoked to resolve this contradiction but it appears that this is not large enough judging fr the 30 yr. difference in water temperatures measured by the Meteor and the Crawford in t profiles across the tropical Atlantic Ocean. *Subject Headings:* **1. Ice budget 2. Clima changes 3. Antarctica.**—*Author's abstract.*

12.10–229 551.324.63:551.336:551.583.3(93

Gage, Maxwell (*Dept. of Geology, Univ. of Canterbury, Christchurch, New Zealand*), **N Zealand glaciations and the duration of the Pleistocene.** *Journal of Glaciology*, Londo 3(29):940–943, March **1961. DWB, DLC**—Recent work has resulted in recognition of additional glaciation preceding the Waimaunga Glaciation in the late Pleistocene. T followed the mid-Pleistocene climax of earth movements responsible for most of the pres mountainous relief of New Zealand, but only after an interval of time long enough for t construction and subsequent deep dissection of Banks Peninsula shield volcano. It is infer from this and other geological evidence that the earliest late Pleistocene glaciation was s arated from the early Pleistocene Ross Glaciation by several hundred thousand years, and t the Pleistocene Period altogether covers at least one million years. *Subject Headings:* **1. N Zealand glaciers 2. Pleistocene glaciation 3. New Zealand.**—*Author's abstract.*

12.10–230 551.583.3:551.324.63(435

Reichelt, Gunther, **Zur Frage einer Rissvereisung des Sudschwarzwaldes.** [The quest of glacier formation in the southern Schwarzwald (Black Forest) during the Riss perio *Erdkunde*, Bonn, 14(1):53–58, March **1960.** 2 figs. English summary p. 53. **DLC**

glaciation of the Schwarzwald during the Riss period, though long presumed, had not so far been proved. Investigations in the southernmost part of the Schwarzwald, the Hotzenwald, in 1951–1958 have brought forth new material justifying the conclusion that this part of the Schwarzwald was indeed glacier covered in the Riss period. The existence of a Riss glaciation is supported as follows: Gravel analyses of the relevant material regarding the degree of roundness resulted clearly in a moraine spectrum; on the basis of the individual spectra both solifluidal and fluviatile transport could be excluded. The degree of weathering of these gravel bodies (they consist on an average of 48% fresh gravel) is considerably higher than in the case of typical Wurm moraines (where the average is 78% fresh gravel). Since in the Riss period the Alpine Aare-Rhine glacier pushed up on the southern edge of the Hotzenwald to maximally about 600 m above sea level, the degree of weathering of the above mentioned deposits can be compared directly with that of the Alpine Riss glaciers. The degree of agreement is high. In some instances, according to composition, deposition, degree of weathering and rounding, it appears that Alpine Riss moraines (from the south-east) and Schwarzwald Riss moraines (from the north) are interlaced in the area Hanner-Rotzel; thus a meeting or mutual superposition of Alpine and Schwarzwald ice bodies in the Riss period can be inferred. Outlining the areas covered with ice in the Riss and Wurm periods shows that the glaciation of the Hotzenwald was considerably more extensive than has been assumed so far. On the whole the investigation led to similar conclusions as those independently reached by Pfannenstiel (in the meantime published, see postscript) for the eastward adjoining area; they greatly supplement the picture of the glaciated part of the western Hotzenwald. *Subject Headings:* **1. Glacier formation 2. Riss glaciation 3. Climatic changes 4. Black Forest, Germany.**—*Author's abstract.*

12.10–231 551.326.62(99)

MacDonald, W. J. P. and Hatherton, T. (*both, Geophysics Div., D.S.I.R., Wellington, N. Z.*), **Movement of the Ross Ice Shelf near Scott Base.** *Journal of Glaciology*, London, 3(29), 859–866, March 1961. 5 figs., table, 6 refs. French and German summaries p. 859. **DWB, DLC**—The rate of movement of the Ross Ice Shelf has been determined at its terminal face to the southeast of Scott Base. An average rate of movement of 23 cm/day in a direction 270° True was determined for the period March 1957 to Oct. 1958. The terminating face of the ice shelf in McMurdo Sound is only about 3 m thick compared with a thickness of several hundred metres in the Ross Sea. Altimeter heights are used to demonstrate a thinning of the shelf which is attributed to melting from below. *Subject Headings:* **1. Ice movements 2. Ross Ice Shelf, Antarctica.**—*Authors' abstract.*

F4. ICE

See also **Ice formation and freezing of lakes, etc.** (Shuliakovskiĭ), 12.10–28; **Build up of thick floating ice, Arctic** (Crary), 12.10–36; **Drift of floating ice island "North Pole-6"** (Sychev), 12.10–37; **Role of Aleutian low in formation of ice, Chuckchee Sea** (Kuznetsov), 12.10–315.

12.10–232 532.78 551.574.1

Hallett, J. (*Dept. of Met., Imperial College, London*), **Crystal growth and the formation of spikes in the surface of supercooled water.** *Journal of Glaciology*, London, 3(28):698–704, Oct. 1960. 8 figs., 8 refs. **DWB, DLC**—Observations made of ice crystals growing on the surface of supercooled water show that they take the form of a composite structure, called surface needles, each of which consists of dendrites growing into the liquid, and of ribs growing in the liquid surface. Each needle is a single crystal. The precise form of the needle is determined by the orientation of the initial nucleus. If its optic axis is near normal to the surface, growth occurs rapidly in two dimensions and covers a much larger proportion of the surface than is covered by the narrow surface needles, so that ice forming this way appears to have its optic axis vertical. Hollow ice spikes observed on pools are shown to have been formed by the freezing of water forced from beneath the surface at the intersection of two or three surface needles, the shape of the spike depending on their orientation. *Subject Headings:* **1. Change of state 2. Ice crystal formation in supercooled water.**—*Author's abstract.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATIONS (551.501)

See: **Met. and met. obs.** (Skliarov), 12.10–7; **Methods in geochemistry** (Smales, Wager, *eds.*), 12.10–14; **Tables and nomograms for processing satellite obs.** (Zhonogolovich, Amelin), 12.10–29; **Drift of floating ice island "North Pole-6"** (Sychev), 12.10–37; **Met. of Mirny Obs. region** (Rusin), 12.10–42; **Aerolog. obs. of First Antarctic Exped.** (Shchekin), 12.10–43; **Upper air wind obs., McMurdo Sound** (Kangos), 12.10–45; **Mauna Loa Obs.** (Price, Pales), 12.10–53; **Climatic extremes for military equipment**, 12.10–130; **Mean hourly rate of meteors recorded by radar** (Fialko), 12.10–163; **Geog. aspects of cosmic ray studies** (Korff), 12.10–183; **A modulated soil moisture budget** (Holmes, Robertson), 12.10 221; **Forecasting the geopotential of the N. Hemisphere** (Belousov), 12.10–349; **Boundary values of potential** (Romov), 12.10–352; **Linear predictability of weather radar signals** (Noel, Fleisher), 12.10–392; **Improving radar storm warning service** (Sal'man), 12.10–393.

OBSERVATIONAL DATA (551.506)

See: **IGY and Czechoslovak cooperation**, 12.10–2; **Climat. summaries, Canadian Arctic**, 12.10–35; **Uyedineniye Island** (Makkaveev), 12.10–38; **Data of aerolog. investigations, Antarctic** (Gaĭgerov), 12.10–40; **Antarctic Symposium, Buenos Aires** (Weill), 12.10–58; **Aeronaut. data, Helsinki** (Nurminen), 12.10–71; **Atmos. experiences of an airline pilot** (Partl, Tank), 12.10–73; **1951 aviation weather summaries, Canadian Arctic** (Wilson, Markham), 12.10–74; **Critical analysis of phenological data from agromet. yearbooks** (Ventskevich), 12.10–94; **Met. accuracies in missile testing** (Lenhard), 12.10–126; **Weather and circulation, Jan. 1959 U. S.** (Stark), 12.10–248; **Meeting met. obs. requirements over sparse data regions** (U. S. W. B.), 12.10–380.

INSTRUMENT CARRIERS (551.507)

See: **Tables and nomograms for processing satellite obs.** (Zhonogolovich, Amelin), 12.10–29; **Items** 12.10–75 to 12.10–85; **Effects of wind and temp. gradients on missiles** (Lifson), 12.10–127; **Ultraviolet spectrum of Sun** (Purcell et al.), 12.10–144; **Profile of solar Lyman alpha** (Purcell, Tousey), 12.10–145; **Photographing the Sun in Lyman alpha** (Purcell et al.), 12.10–146; **Solar ultraviolet spectroscopy** (Rense), 12.10–147; **Measurement of meteoritic dust using rockets and satellites** (Dubin), 12.10–165; **Protons and electrons in visible auroras** (McIlwain), 12.10–198; **Weather information and econ. decisions** (Nelson, Winter), 12.10–233; **Trial wave forecasting** (Koido, Hanzawa), 12.10–351.

INSTRUMENTS (551.508)

See: **Met. accuracies in missile testing** (Lenhard), 12.10–126; **Expendable atmos. radio refractometer** (Deam), 12.10–134; **Cloud chamber evidence for presence of nuclear active particles at mountain altitudes** (Naranan et al.), 12.10–185; **Cosmic ray investigations with an air-borne neutron monitor** (Pomerantz et al.), 12.10–187; **Cosmic ray meter and cosmic ray fluctuations** (Torizuka, Wada), 12.10–189.

SYNOPTIC ANALYSIS AND FORECASTING

GENERAL FORECASTING (551.509)

See also: **Frost protection sprinkling** (Burckhardt), 12.10–86; **Man's influence on tropical vegetation** (Aubert de la Rüe), 12.10–96; **Advances in silviculture** (Melekhov), 12.10–97.

12.10–233 551.507.362.2 551.509:003

Nelson, Richard R. and Winter, Sydney G., Jr., **Weather information and econom decisions: a preliminary report.** Prepared for National Aeronautics and Space Administratio

Rand Corporation, Santa Monica, California, Research Memorandum RM-2620-NASA, Aug. 1, 1960. 121 p. figs., tables, foot-refs., eqs. **DWB** (507.2 R186r)—A pilot study on the economic implications of meteorologically instrumented satellites. Satellite observations are expected to improve weather forecasts, directly by use in existing forecasting techniques, and indirectly through contributions to the basic understanding of atmospheric processes. The study examines ways in which weather information enters into economic decisions. It develops methods for determining the dollar value of information varying in quality from climatological probability to the "perfect" forecast, and it illustrates these methods by applying them to a number of typical business decisions. Part of the analysis deals with methods for maximizing the economic value of forecasts, in both simple and sequential decisions. The result suggests that even without improvements in forecasting skill there are opportunities to increase the value of forecasts by improving the form in which the forecaster communicates his inferences to the user. *Subject Headings:* **1. Economics of weather forecasts 2. Meteorological satellites.**—*E.Z.S.*

12.10–234 551.509.314:519.241.1

Wood, Charles P. (*Climatic Center, U. S. Air Force*), **A note on multiple-regression equations.** *Journal of Meteorology*, Boston, 18(1):109–111, Feb. **1961.** 2 figs., 7 refs., 21 eqs. **DWB, DLC**—A discussion of several ideas which would be of interest to anyone involved in developing statistical prediction equations. The ideas discussed are: a) cutoff, b) form of the predictand and c) limit of predictability. It is pointed out that the upper limit of predictability is determined by three factors: 1) the effect of errors in the measurement of both the predictors and the predictand, 2) the completeness of the set of possible predictors available to the screening process and 3) the effectiveness of the statistical process in representing the atmospheric processes. A method of estimating the effect of observational errors is explained. *Subject Headings:* **1. Multiple-regression equations 2. Statistical forecasts 3. Statistical prediction equations.**—*E.Z.S.*

Telecommunications and Codes (551.509.1)

See also: **Admiralty list of radio signals,** 12.10–30.

12.10–235 551.509.1:551.576.12

Alaka, M. A., **The coding of clouds: a new approach.** *World Meteorological Organization, WMO Bulletin*, 9(2):105–109, April **1960.** 4 photos, 2 refs. **DWB**—Describes the efforts made to evolve a code to describe cloudiness in terms of the appearance of the *whole sky*, based on a code for the tropics proposed as an outcome of a study of tropical clouds and their relation to weather on a synoptic scale, made jointly by the Dept. of Meteorology of the Univ. of Chicago and Woods Hole Oceanographic Institution. The procedure in evolving this code is given. To indicate the importance of this new approach to cloud observations, cloud codes now in use are discussed. Author believes that basic principles and procedures used in constructing this new *whole sky* code for the tropics may be applicable for evolving a modern sky code which will avoid the defects of present codes. *Subject Headings:* **1. Cloudiness classification 2. Cloud codes.**—*M.L.R.*

12.10–236 551.509.1:621.396:551.524

Bhatnagar, V. P. and Bhatnagar, D. P. (*Dept. of Physics, M. L. B. College, Gwalior*), **Transmission of temperature data by change in depth of modulation.** *Journal of Scientific and Industrial Research, Sec. B*, New Delhi, 19(5):152–154, May **1960.** 4 figs., 9 refs. **DWB, DLC**—A wireless method of transmitting data on temperature is described. The principle employed is based on the fact that changes in temperature which are to be transmitted bring about corresponding changes in the resistance of a thermistor placed in an a.f. circuit. The a.f. voltage across the resistance is used to modulate the carrier of the transmitter. The changes in the depth of modulation are read at the receiver end on a meter directly calibrated in degrees of temperature. The usefulness of the method is demonstrated for ranges of a few hundred meters and can be satisfactorily extended to long ranges with suitable means for receiver noise suppression and a more powerful transmitter. In contrast to the fixed receiver

in line channel systems, the method can be used in place of a line channel system where the latter cannot be used for practical reasons. *Subject Headings:* **1. Temperature data transmission 2. Data transmission.**—*Authors' abstract.*

12.10–237 551.509.1(26)

Lange, (Capt.), **Antwort auf eine oft gestellte Frage.** [Answer to an often-posed question.] *Wetterlotse*, Hamburg, No. 133:152–155, July **1958.** **DWB**—The usefulness of delayed weather reports from ships and their evaluation for sea climatology is explained. *Subject Heading:* **1. Ship's weather reports.**—*O.T.*

Bulletins, Charts and Diagrams (551.509.2)

12.10–238 551.509.2

Lin, S. H., **A short discussion on surface weather map analysis in China.** *Meteorological Bulletin*, Taipei, Formosa, 1(4):29; 51. Dec. **1955.** In Chinese. **DLC** (Orientalia)—No matter how the weather chart may be organized, the slightest carelessness will result in error so the author suggests several factors that should be kept in mind. They are: delayed reports, miscalculated reports, ship-observations, continuity, surface and upper-air diagrams, middle line charts, central air pressure, front and precipitation zone, wind direction and speed, name of chart, etc. *Subject Headings:* **1. Weather map analysis 2. China.**—*K.C.*

12.10–239 551.509.2:621.396.029

Metzger, Bozo (*Zagreb*), **Ultrakratki valovi i njihova primjena za vezu s planinskim meteorološkim stanicama (s posebnim obzirom na radiovezu Zavižan-Zagreb).** [Ultrashort waves and their application to communication with meteorological mountain stations (with particular reference to radio communication between Zavižan and Zagreb).] *Zagreb, Yugoslovia. Hidrometeorološki Zavod NR Hrvatske, Rasprave i Prikazi*, 8(4):183, **1959.** Serbo-Croatian and German summaries only. **DWB**—The article covers: ultrashort waves and their features; influence of terrain and advantages offered by ultra-short waves; special problems to be solved for the establishment of the weather short wave connection Zavižan-Zagreb and report on the status of work and the prospects for its completion. *Subject Headings:* **1. Radio weather messages 2. Zagreb, Yugoslavia.**—*O.T.*

12.10–240 551.509.2(02)

§U. S. Air Weather Service, **Preparation of weather maps and charts.** Its *AWSM Manual* 105-22, April 1, **1960.** 30 p. figs., forms. "Supersedes AWS Manual 105-22, Aug. 1, 1955 including subsequent changes." **DWB** (M(055) U58am)—This manual establishes standard methods to be used when entering data analyses and prognostic information on meteorological charts in general use within the Air Weather Service, U. S. Air Force, April 1, 1960. The instructions are basic in nature and are given for chart preparation policy, work charts, and the preparation of synoptic and prognostic charts. *Subject Heading:* **1. Synoptic chart preparation**—*E.Z.S.*

Short Range Forecasts (551.509.21)

12.10–241 551.509.21(26)

McKee, W. J. (*Marine Supt., W. B. New York City*), **Marine weather bulletin initiated in Port of New York.** *Mariners Weather Log*, Wash., D. C., 4(1):1–2, Jan. **1960.** fig. **DWB**—As a result of the request by marine interests, the Weather Bureau of the New York City is preparing daily bulletins, forecasting weather in Atlantic and coastal areas. For many years a weather bulletin was published by the Weather Bureau. Additional information now being added to the original bulletin include forecasts on coastal areas from Maine to N. C. This is going to be a great help to the shipping industry. *Subject Heading:* **1. Marine weather forecasting.**—*A.H.K.*

12.10–242 551.506.7:551.509.21(02)

U. S. Air Weather Service, **Weather use of asynoptic data in analysis and forecasting.** Its *Manual*, 105-10, March 11, **1960.** 27 p. 10 figs., ref. **DWB**—Asynoptic data provide

valuable supplements to synoptic data. It adds more detail to centralized synoptic analysis when necessary. The asynoptic data may be used in aircraft reconnaissance reports in analysis of synoptic constant pressure charts. In Fig. 1 and 2, hypothetical data displacement is shown. In the case of upper air data as well as in the case of surface reports, asynoptic upper air reports are very valuable. *Subject Headings:* **1. Analysis and forecasting 2. Asynoptic data analysis.**—*A.H.K.*

Prognostic Charts (551.509.25)

See also: **24-hr prognostic charts,** 12.10–367; **"Poor man's" numerical weather prediction system** (Shafer), 12.10–376; **Synthesis of a prognostic chart** (Shafer), 12.10–377.

12.10–243 551.509.25

Sugimoto, Y. and Ono, K., **A practical method of making 200 mb prognostic chart.** *Journal of Meteorological Research,* Tokyo, 12(11):776–779, Nov. **1960.** 3 figs., table, 2 refs. In Japanese; English summary p. 776. **DWB, DLC**—A practical method of making the 200 mb prognostic chart in routine work is described. From the scatter diagram showing the relation of 36-hour height changes for 500 mb (ΔH_{500}) and 200 mb (ΔH_{200}), the following regression equation is obtained. $\Delta H_{200} = -20 + 0.87 \Delta H_{500}(m)$. As ΔH_{500} may be estimated by using the 500 mb prognostic chart made with the aid of electronic data processing machine, ΔH_{200} can be estimated with the above equation. Thus the 200 mb prognostic chart will be obtained graphically by compositing the 200 mb chart upon the chart for ΔH_{200}. An example for 0000 GMT 25 March 1960 shows the method available. *Subject Heading:* **1. 200 mb prognostic chart preparation.**—*Authors' abstract.*

FORECASTING METHODS (551.509.3)

See also: **Data of aerolog. investigations, Antarctica** (Gaïgerov), 12.10–40.

12.10–244 551.509.3(213)

Gentry, Robert C. (*Miami Hurr. Warning Center, U. S.*), **Tropical analysis.** (In: Caribbean Hurricane Seminar, Ciudad Trujillo, Feb. 1956, **Final Report of the Seminar,** pub. **1956.** pp. 166–172. 7 refs.) **DWB**—In a tropical analysis program the following elements should be used: maps that portray conditions in both the lower and higher portions of the troposphere. Because pressure gradients are so weak, it is better to put major emphasis on wind analysis rather than on pressure analysis. Time cross sections are useful in the analysis program and for forecasting in the vicinity of the observing station, and also for a considerable distance downwind. *Subject Headings:* **1. Tropical weather analysis 2. Weather forecasting techniques.**—*E.Z.S.*

12.10–245 551.515.7:551.509.3(52)

Hashimoto, K., **The formation of warm high over the Japan Sea in July 1958.** *Journal of Meteorological Research,* Tokyo, 12(4):209–215, April **1960.** 11 figs., 10 refs., 2 eqs. In Japanese; English summary p. 209. **Comments** by T. Saito and (**Reply** by) Hashimoto, *Ibid.,* 13(3):249–250, March **1961.** fig. In Japanese. **DWB, DLC**—In this paper, the author investigated the warm high formed over the Japan Sea in the second decade of July 1958, based on the analysis of 500 mb charts. The results obtained analytically may be summarized as follows: (1) This warm high is the so-called "blocking high" closely associated with the long wave trough over the Far East, and formed an Ω-shaped pattern. (2) The deepening of frontal trough extending along the southeastern periphery of warm high seems to be caused by the formation of cold low and meandering westerlies and is explained by the theory of J. Bjerknes which related the increase in amplitude to the "dynamic instability" on the ridge upstream under certain conditions. The warm high made the upper tropospheric northeasterlies persist over Japan. *Subject Headings:* **1. Warm high formation 2. Japan Sea.**—*Author's abstract.*

12.10–246 551.509.3 551.509.3

Holl, Manfred M., **On meteorological objective analysis and model theory.** Stanfo Research Institute, Menlo Park, Calif., Contract AF 19(604)-5703, Final Report, July 196 39 p. 6 figs., 2 refs., 51 eqs. **DWB**—The development of a system for the analysis of meteor logical distributions by the objective treatment of observational data is systematically d cussed. The information sources are considered to fall into three categories: (1) data co current with the time of the space-distribution analysis, (2) near-past data containing i formation which may be extrapolated forward in time to the analysis, and (3) well-past da from which come physical laws, statistical and empirical relationships, and subjective, learne skills. The investigation is limited to considerations of the space-time analysis of the sta parameters (pressure, temperature and density) and the wind. The state-parameters a dealt with from the point of view of interrelationships, degree of independence, manne of specification, and transformations. The analysis system is built up on the use of dynamical numerical model as data vehicle. The basic system of governing equations illustrated with density as principal dependent variable of state, and the importance of t horizontal mass-divergence is indicated. The mass-continuity equation is shown to have near-perfect numerical analogue. The mechanism by which the atmosphere maintai approximate geostrophic balance is considered. Numerical techniques are suggested f possible realization of this wind alignment to a natural degree in the integration without rig imposition in the model. The propagation of meteorological "noise" and its suppression also discussed. *Subject Headings:* **1. Space-time analysis 2. Dynamic numerical mod 3. Meteorological "noise."**—*Author's abstract.*

12.10–247 551.509.3:551.5

Rikitake, T., **On the movement and deformation of disturbance, Pt. 1.** *Journal Meteorological Research*, Tokyo, 12(6):350–356, June **1960.** 3 figs., 2 refs., 44 eqs. In Jap nese; English summary p. 350. **DWB, DLC**—In this paper the author suggested a n method to estimate the movement and deformation of the field of physical properties. Maki use of this method, the author showed that the relation between the deformation of physi field and the wind difference at two points selected arbitrary on the concerning field has t extended physical meaning of the "shearing instability." The author showed also the amples of application of this method to the "sound wave," "Rossby wave," "pressure jum and "cyclone and anticyclone." In the particular case, this method gives the result simi to that by the "kinematical method" which has been used to forecast the pressure field, or th by the "method of characteristics" for the "simple wave." The author also showed so techniques which can be used when this method is unsuitable to estimate the change of physi field. *Subject Headings:* **1. Pressure field forecasting 2. Shearing instability.**—*Autho abstract.*

12.10–248 551.509.3:551.506.1:551.582.2:551.513(

§Stark, L. P. (*Extended Forecast Sec., U. S. W. B., Wash., D. C.*), **The weather and circu tion of Jan. 1959: a month of exceptional persistence from the preceding December.** *Mont Weather Review*, Wash., D. C., 87(1):33–39, Jan. **1959.** 10 figs., table, 10 refs. **DWB, DLC** The very high persistence over North America from December to January was one of the o standing facets of the monthly mean weather and circulation of Jan. 1959. Only two cl changes of weather anomalies are noted. 96% of the stations did not change by more th one class. Persistence of the 700 mb pattern was pronounced with only one exception. T hemispheric circulation in January consisted of a wave number of four in middle latitud The large high over the Beaufort Sea was an especially significant center of action in influenc weather in the U. S. High latitude blocking over North America has been a circulati feature of varying magnitude in each month since June 1958. Variability in the West Hemisphere is noted. Several injections of Arctic air east of the Divide produced a c regime in the east. A prominent precipitation feature is the band of above normal precipitat which extended from Pacific Northwest through the Ohio Valley and into New Engla *Subject Headings:* **1. Synoptic conditions, U. S. (Jan. 1959) 2. Persistence 3. Atmosphe circulation 4. United States.**—*E.Z.S.*

12.10–249 551.509.317:551.513.2(98)

Ueki, K., **Investigation on the forecasting rules and techniques, Pt. 3.** *Journal of Meteorological Research*, Tokyo, 12(5):306–313, May 1960. 15 figs., 3 tables, 6 refs., eq. In Japanese; English summary p. 306. **DWB, DLC**—In this paper, the author has devised a method of forecasting the movement of low area at 700 mb level in the Arctic region, according to La Seur's suggestion on the asymmetry of circumpolar currents, and has introduced two indices for the extended forecast. Namely, he smoothes up, with 5-day moving average, the amount of "Action Main Stream" introduced in the 1st and 2nd reports. Employing the values thus obtained, he produces an index indicating that the low area inclines to lie either on Octant 0 or 2, and another index indicating that the low area belongs to either eastern or western part of Octant 2. The former is called as the first weather trend index, and the latter as the second weather trend index. Next, he produces the several evidences that the negative values of the indices correspond to peculiar phenomena in the vicinity of Japan, and that the indices may be used for the extended forecast with expectation that the weather trend in the forecast period can be grasped by extrapolation of indices. *Subject Headings:* **1. Forecasting techniques 2. Weather indexes 3. Arctic.**—*Author's abstract.*

Forecasts from Daily Synoptic Charts (551.509.31)

See also: **Improvement of single station weather forecasts** (Lu), 12.10–366.

12.10–250 551.509.31:681.14:621.38

Gandin, L. S., **Raschetnye metody analiza kart.** [Calculation methods for chart analysis.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia*, *Trudy*, No. 99:48–66, **1959.** 2 figs., 17 refs., 7 eqs. **DWB**—A discussion of the present state and prospects of development of numerical weather map analysis. The author takes successively up the problems of: 1. feeding the initial data into the machine for numerical analysis; 2. interpolation, coordination and smoothing of fields; 3. checking, rejection and correction of data; 4. effectiveness of numerical methods of analysis; 5. drawing of isoline charts with the aid of electronic computers. In the course of the discussion the author indicates some rational ways of developing numerical forecasting and predicts that a complete automation of the weather service will take place in a comparatively short period. *Subject Headings:* **1. Synoptic chart analysis 2. Numerical weather map analysis.**—*A.M.P.*

12.10–251 551.509.31(66)

Germain, Henry (*Main Met. Office, Dakar-Yoff*), **Synoptic analysis for West Africa and the southern part of the Atlantic ocean.** (In: Caribbean Hurricane Seminar, Ciudad Trujillo, Feb. 1956, **Final Report of the Seminar,** pub. **1956.** p. 173–186. 8 figs.) **DWB**—A brief description of the air masses, the continental intertropical front or monsoon front, squall lines, trade wind fronts, cold fronts and maritime intertropical fronts. Hurricane or tropical cyclones are not feared here but is is sometimes possible to observe what appears to be their earliest stage of formation. Between July and October the sea temperature oscillated between 29 and 30° and the vertical structure of the atmosphere showed a latent instability; a state of latent cyclogenesis. Cold air from the south gives rise to a vortex in which a cyclonic circulation forms but moves westward. The formation of Connie was detected here. Forecasts of cyclone formation have been experimental but will be made systematically. *Subject Headings:* **1. Synoptic analysis 2. West Africa 3. South Atlantic.**—*E.Z.S.*

12.10–252 551.509.311:551.515.8(98)

Harley, D. G., **Frontal contour analysis of a "polar" low.** *Meteorological Magazine*, London, 89(1054):146–147, May **1960.** ref. **DWB, DLC**—A case of an apparent "Polar" low in Greenland is described. The frontal contour analysis used in Canada can not be used in Greenland. In Canada when Arctic air covers the plains east of the Rockies, depressions, having the form of frontal waves in the westerlies overlying the cold air, frequently move eastward. The frontal surfaces remain well above the ground and frontal contour analysis

deals with this situation. *Subject Headings:* **1. Frontal contour analysis 2. Polar lo 3. Arctic air circulation 4. Greenland.**—*E.Z.S.*

12.10–253 551.509.31:551.511.32:532

Kibel', I. A., **Konechnoraznostnaia skhema resheniia polnoi sistemy uravnenii kratko rochnogo prognoza pogody i sootnosheniia kvazigeostrofichnosti.** [Finite differential schen of solution of complete system of equations for short range weather forecasting and quas geostrophic correlations.] *Akademiia Nauk SSSR, Doklady*, 132(2):319–322, **1960.** 2 ref 29 eqs. **DWB, DLC** –The problem of short range forecasting with a complete system of t hydrodynamic equations is discussed with the consideration of four functions, geopotenti (ϕ), horizontal components of wind (u, v) and equivalent vertical component of velocity (w Four differential equations are used for the determination of these functions. The math matical processes for the simplification with substitutions and solution of these equations b integration are described in detail. The analysis and interpretation of final equations f use in short range weather forecasting are described in the text. *Subject Headings:* **1. Sho range forecasting 2. Quasi-geostrophic correlations.**—*N.P.S.*

Structure of Disturbances (551.509.311)

See also: **Synoptic conditions for transport of sea air during winter, S. Far East** (Trostnikov), 12.10–331; **Barotropic forecast errors in sea level cyclogenesis** (Spiegler), 12.10–378.

12.10–254 551.509.311:551.515.13(57

*Agarkova, A. P., **Vykhod iuzhnykh tsiklonov k raĭonam Kamchatki v kholodnoe vrem goda.** [Incursion of southern cyclones in Kamchatka regions during the cold season.] *Dal'n vostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:68–9 **1960.** 6 figs., 10 tables, 12 refs. Russian summary p. 91. **DWB**—The conditions of t development of cyclones in southern latitudes (south of 50°S lat. between 100 and 180°E lon and their movement toward Kamchatka and the surrounding seas, and also the possibility establishment of prognostic indicators for cyclonic incursions 2–3 days in advance are examin The incursion of southern cyclones into Kamchatka occurs during the entire year with maximum frequency during November–March. The principal center of formation of southe cyclones during the cold season is situated over the Sea of Japan and adjacent regions wher frontal zone aloft is present. The indicators of cyclogenesis over Japan are the divergence high altitude flow in the case of considerable temperature contrasts and centers of posit interdiurnal isallohypses at AT_{500}. Cyclones appear every 24 hours after the manifestat of a center of positive isallohypses. When the Pacific anticyclone is considerably develop and, hence, during a meridionally oriented frontal zone aloft, cyclones move toward hig latitudes. When the Asiatic anticyclone is more highly developed and the Pacific anticyclo is less developed the southerly cyclones move with more easterly components, i.e., considera south of Kamchatka. *Subject Headings:* **1. Cyclogenesis forecasting 2. Synoptic conditi for cyclone formation 3. Kamchatka, Asiatic U.S.S.R.**—*Transl. of author's summary & I.L*

12.10–255 551.509.311:551.509.326:551.51

§Ardis, Colby V., Jr. (*Wisconsin Michigan Power Co., Appleton, Wisconsin*), **An object method for forecasting thunderstorms at Truax Field, Madison, Wisconsin.** *Ameri Meteorological Society, Bulletin*, 42(3):166–174, March **1961.** 4 figs., 6 refs. **DWB, DLC.** A Thesis (M.Sc.)-Wisconsin Univ. **1959.** 50 p. figs., 6 tables, 3 refs.—Thunderstorm activity Madison is frontal or found in association with fronts. The objective method derived forecast thunderstorms determines first the air mass favorable for the occurrence of thun storms and secondly if there is a front within 24 hr of Madison to release the latent instabil needed to produce the thunderstorm. The air-mass predictors used are (1) the Showa Stability Index, (2) the freezing level and (3) the surface dew-point temperature at Madis The synoptic (frontal) predictors used are (1) the difference in surface temperatures

face dew-point temperatures, Madison minus LaCrosse, (2) the surface wind direction Madison and (3) the three-hour pressure tendency at Madison. The method derived is each of the summer months June, July and August. Five years of data were used for development of each month, and two years of data were set aside for its test. Four atter diagrams were developed for each month from which, within minutes each morning, orecaster can obtain a dependable "YES" or "NO" forecast of thunderstorm activity at adison without reference to his normal techniques and procedures used to forecast thunder- orms. The results for June, July and August based on two years data each are the following rcent correct/skill scores: 87/0.59, 91/0.62, 91/0.76, respectively. *Subject Headings:* **1. Ob- tive forecasting 2. Thunderstorm forecasting techniques 3. Frontal thunderstorms.**— *uthor's abstract.*

12.10–256 551.509.311(57)

§Bogdanovskiĭ, I. G., **Redkiĭ sinopticheskiĭ protsess.** [An uncommon synoptic process.] *eteorologiia i Gidrologiia*, Leningrad, No. 3:38–39, March **1960.** fig. **DWB, DLC**—Synoptic ocesses, observed during June 13 and 14, 1958 above the southern part of western Siberia ve definite characteristics of anomaly, which are described in detail. One practically un- ovable high altitude cyclone was centered at 500–600 km north of the Taimir Peninsula. nother, almost stationary cyclone was centered above the Altai. Both cyclones were inter- nnected at great height (500 mb). Unusual distribution of warm and cold air and formation two high frontal zones (over Central European territory and over the Altai and Krasnoyarsk d farther in the southwest) with waves moving with a velocity of 50–60 km/hr are demon- ated to be rare phenomena which are difficult to forecast, especially in the summer. After e study of the process which occurs in the east a few symptoms and characteristics, useful forecasting, were discussed. *Subject Headings:* **1. Synoptic processes 2. Synoptic forecast- g 3. Western Siberia.**—*N.P.S.*

12.10–257 551.509.311:551.515.83(477)

*Dzivakovskaia, L. A., **Frontal'nye volny na iuge Ukrainy.** [Frontal waves in southern raine.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, . 7:54–59, **1957.** 5 figs., 2 tables. **DWB**—A study of frontal disturbances which passed er the Ukraine in the period between 1950 and 1953 was made. The aim of the study was establish the most characteristic types of synoptic processes at which the development of ves in fronts starts, and to characterize the distribution of meteorological elements in the gion of the waves. Initial data consisted of daily synoptic charts, contour charts for 850 and 700 mb and thickness charts. Definition of the fronts with wave disturbances is given. 723 fronts investigated, 231 were with frontal waves. Discussions and evaluation are strated with 2 tables of fronts distribution and 5 maps. *Subject Headings:* **1. Synoptic nditions for frontal formation 2. Frontal waves 3. Ukrainian S.S.R.**—*B.J.G.*

12.10–258 551.509.311:551.515.8

Fujita, T. (*Met. Res. Inst.*), **Advance of season in view of upper planetary wave.** *Papers Meteorology and Geophysics*, Tokyo, 7(1):7–28, April **1956.** 14 figs., 5 refs., 6 eqs. **DWB**— his study investigates the behavior of a long wave in upper planetary waves as the season vances. In the normal situation about 90% of the total amplitude is occupied by the sultant wave for $n=1$, 2, 3 except for the summer season. One of the troughs of each com- nent wave is located near 160°E long. The amplitude of each wave is largest in winter and allest in summer. As a result of Fourier analysis for normal zonal index, the shifts of sition where zonal wind is minimum are larger than those of height pattern along 50°N itude circle. In the monthly difference patterns for normal 500 mb height profile, the ing tendency from March to April is maximum at the zone between 80°N and 90°N lat. he various characteristics in the monthly differential pattern of normal 500 mb chart are scussed. In a 5-day mean situation, about 90% of the total amplitude may be sufficiently presented by the resultant wave number ranging from one to six. The fluctuations of the plitude for various wave numbers are mutually related. *Subject Headings:* **1. Upper anetary waves 2. 500 mb charts 3. Long waves.**—*From author's abstract.*

12.10–259 551.509.311:551.513.2:551.5

Kobayashi, K., **On the mechanism of 10-day period in atmospheric disturbance in mid latitudes.** *Journal of Meteorological Research*, Tokyo, 12(5):322–334, May 1960. 16 fi 4 tables, 11 refs. In Japanese. **DWB, DLC**—Until recent times short range forecastin atmospheric disturbances in middle latitudes was mathematically analyzed by considering anticyclone as a sort of wave motion phenomena or periodic phenomena of wave motion. author, however, has attempted to find a standard periodicity in climatic phenomena u 500 mb Northern Hemisphere weather charts, and analyzing the appearance of the jet str and its development into a cyclone and an anticyclone. It is concluded that for effec short range forecasting the mechanism of the jet stream and cold air masses have to be analy *Subject Headings:* **1. 10-day forecasting 2. Periodic atmospheric disturbances 3. 500 charts 4. Jet stream forecasting.**—*K.C.*

12.10–260 551.509

Kupianskaia, A. P., **O prognoze evoliutsii vysotnykh tsiklonov i antitsiklonov.** [F casting the evolution of high-level cyclones and anticyclones.] *Meteorologiia i Gidrolo* Moscow, No. 5:17–22, May 1960. 2 tables, 5 refs., 6 eqs. **DWB, DLC**—Individual variat of geopotential and basic centers were determined from AT_{750} and AT_{700} charts and the fam

$$\frac{dH}{dt} = 0.1\Sigma c_\tau;$$

$$\frac{d^2H}{dt^2} = [-8.0\Delta\bar{H} + 1.5\Sigma c_\tau] + 0.1\left[\frac{\partial^2\bar{H}}{\partial x^2}\frac{\partial^2\bar{H}}{\partial y^2} - 3.0\left(\frac{\partial^2\bar{H}}{\partial x \partial y}\right)^2\right]$$

for cyclones;

$$\frac{d^2H}{dt^2} = [-14.0\Delta\bar{H} + 1.5\Sigma c_\tau] + 0.3\left[\frac{\partial^2\bar{H}}{\partial x^2}\frac{\partial^2\bar{H}}{\partial y^2} - \left(\frac{\partial^2\bar{H}}{\partial x \partial y}\right)^2\right]$$

for anticyclones; and

$$\delta H = \left(\frac{\partial H}{\partial t}\right)t + \frac{1}{2}\left(\frac{\partial^2 H}{\partial t^2}\right)t^2.$$

In these equations H = geopotential height of an isobaric surface, t = time, x, y = horiz coordinates, c_2, c_τ = radial and tangential components of the wind vector, $\Delta\bar{H}$ = magni of the Laplacian of H averaged over area, the horizontal bar on the second order deriv of H = sign of averaging over area. Individual variations of geopotential heights for 12 cyclones and 5 cyclones and the results of forecasts of individual variations of geopote heights in pressure centers for 129 cases are presented in tables. The origin of expect hour individual variation of geopotential altitudes of isobaric surfaces in centers of cyc and anticyclones with a probability of 65% is determined by wind divergence (converg averaged over area. The first term of the individual acceleration in the formulas for cyclones and cyclones is proportional to the difference between the geostrophic vortex an vortex of the wind vector. The success of forecasts of the sign of evolution of pressure ce according to the complete acceleration formulas for anticyclones and cyclones is 70%. signs of actual individual variations of geopotential heights in baric centers coincide in of the cases with the sign of variation computed by formulas in the form of the sum of the and second individual derivatives since in the acceleration only the first term produce ageostrophic atmospheric motions was considered. The sign of the calculated indiv variations of absolute geopotential in baric centers by the above formulas taken in co form coincide with the sign of the actual 24-hour variations in 86% of the cases. *S Headings:* **1. High level cyclone forecasting 2. Geopotential height.**—*I.L.D.*

12.10–261 551.509.311:551.515.13:551.578.45

Levdikova, T. V., **Meteli na Ukraine v sviazi s vykhodom iuzhnykh tsiklonov.** [S storms in the Ukraine in connection with the exit of southern cyclones.] *Kiev, Uk Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:75–86, 1959.

lables. **DWB, DLC**—In view of the fact that the forecast of snowstorms depends in great measure on the correct forecasting of southern cyclone trajectories—the purpose of this study is to reveal the pronostic indications enabling one to foresee at least 24 hours in advance the trajectory of a cyclone moving from the Mediterranean Sea in a NE direction, as well as the region of the snowstorms expansion. From a total of 101 cyclones that moved over the Ukraine in the winters of 1936–1940 and 1944–1949, three graphs of southern cyclones were separated out and the synoptic and weather conditions accompanying each of these graphs were analyzed and examplified on composite charts of surface pressure fields 24 hours before the exit of the cyclones. It is shown that in each individual case the pressure field has its own peculiarities (magnitude of temp., contrast, advection, curvature, vertical currents) although the general structure of the pressure field remains preserved. *Subject Headings:* **1. Cyclone trajectory forecasting 2. Snowstorm forecasting 3. Synoptic conditions for snowstorms 4. Ukrainian S.S.R.**—*A.M.P.*

12.10–262 551.509.311 :551.524.73 :551.515.13/73

*Ponomarenko, I. N., **K ispol'zovaniiu poleĭ temperatury na urovniakh poverkhnostei 700 i 500 mb dlia prognoza peremeshcheniia tsiklonov i antitsiklonov.** [Use of temperature fields at 700 and 500 mb levels for forecasting cyclone and anticyclone displacements.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 12:88–99, **1958.** 4 figs., 7 tables, 9 refs. **DWB**—The article begins with a statement that in recent times attempts have been made to tie cyclones and anticyclones with the changes in density of the atmosphere at mean and high levels created by the changes in temperature fields. The review of numerous works, domestic and foreign, and corresponding analyses are given. The use of isothermal and isallobaric maps is described and illustrated with tables of data. In conclusions, several examples of cyclones and anticyclones motion in southern regions of European territory of U.S.S.R. are given. The article carries 4 maps of isallotherms. *Subject Headings:* **1. Temperature fields 2. Synoptic charts 3. Pressure charts 4. Forecasting cyclone and anticyclone displacement.**—*B.J.G.*

12.10–263 551.509.311 :551.515.83 :551.513.2

Serra, Adalberto (*Met. Service, Brazil*), **O principio de simetria (circulacão secundaria no Hemisfério Sul).** [The principle of symmetry: secondary circulation in the Southern Hemisphere.] Rio de Janeiro, Servico de Meteorologia, **1960.** 41 p. 6+27 figs. Mimeo.—Also shorter English version, **Principle of Symmetry,** issued Rio de Janeiro, **1958.** 14 p. chart, 4 refs. Mimeo.—The principle of symmetry on polar-front movements is explained in the 1958 publication and elaborated in the second publication, 1960. The new principle of weather analysis for forecasting in Brazil is based on a comparison between northern and southern hemispheric circulation. The principle appears to be demonstrated by the analysis of daily charts. An explanation of the tropical isobar displacement is presented through detailed studies of several regions: the American area, Atlantic area, Africa and the Indian and Pacific Oceans. It is concluded that western and eastern hemisphere charts are more useful for forecasting purposes than the present maps. The period of study was during June, July, and Aug. 1954. Data from Argentine, Brazil and Chile were used for analysis. *Subject Headings:* **1. Forecasting methods 2. Polar front movement 3. Hemispheric circulation 4. Brazil.** —*E.Z.S.*

12.10–264 551.509.311 :551.553.21 (529)

Wang, Shih-ting, **Forecasting of monsoon in winter in Formosa.** *Meteorological Bulletin*, Taipei, Formosa, China, 1(1):17–23, March **1955.** 18 figs., 6 tables. In Chinese. **DLC**—Because of the polar high which forms in Siberia in winter, a great variation of monsoon between 30°S and 15°N (with the mean polar front positioned toward the south of Formosa), influences the weather in Formosa. Monsoon variation was analyzed by three NPc air masses: on land, cold sea front and warm sea front. The influence of each NPc air mass on the weather in Formosa is discussed, as well as the variational processes affecting low cloud and humidity and strong wind (shown in figures). *Subject Headings:* **1. Winter monsoon forecasting 2. Formosa.**—*K.C.*

Numerical Forecasting (551.509.312/3)

See also: **Graphical integration of barotropic vorticity equation** (Huber-Pock), 12.10–288.

12.10–265 551.509.312 551.54

Burtsev, A. I. and Leonov, N. G., **Naklon prostranstvennoĭ osi baricheskikh obrazovaĭ** [Slope of the spatial axis of pressure systems.] *Meteorologiia i Gidrologiia*, Moscow, N 5:11–16, May **1960.** 15 eqs. **DWB, DLC**—The authors attempt to obtain quantitat relationships connecting the magnitude of slope of a spatial axis of a pressure center and t characteristics of the thermobaric field. It is shown that the horizontal coordinates of centers of basic structures on two adjacent isobaric surfaces are associated by the relations

$$x = x_0 + \frac{R}{gp}\frac{T_x H_{yy} - T_x H_{xy}}{H_{xx}H_{yy} - (H_{xy})^2}(p_1 - p_0)$$

$$y = y_0 + \frac{R}{gp}\frac{T_y H_{xx} - T_x H_{xy}}{H_{xx}H_{yy} - (H_{xy})^2}(p_1 - p_0)$$

If the axes of symmetry of pressure axes are taken as axes of coordinates then

$$x = x_0 + \frac{R}{gp}\frac{T_x}{H_{xx}}(p_1 - p_0)$$

$$y = y_0 + \frac{R}{gp}\frac{T_y}{H_{yy}}(p_1 - p_0)$$

In these equations H_x, H_y = horizontal geopotential gradients. It is seen that the displacem of the center of basic structure on the upper level relative to its center on the lower leve determined by four factors: 1) horizontal gradients of temperature (T_x, T_y); 2) thickness of isobaric layer ($p - p_0$); 3) magnitudes H_{xx}, H_{yy}, characterizing the curvature of the isoba surface; and 4) pressure. An actual example shows that the most apparent decline in sl of the axis occurs in the first period of development of a cyclone up to its occlusion when te perature contrasts at its center did not change essentially. The slope of the axis of a ba structure depends essentially upon the pressure on the isobaric surfaces being investigat The tangent of the angle of slope of the axis of a pressure surface is given by

$$tg\varphi = \frac{gp}{R\sqrt{\frac{T_x^2}{H_{xx}^2} + \frac{T_y^2}{H_{yy}^2}}}$$

Furthermore since the displacement of the pressure center with height is not directed stric along the horizontal temperature gradient but may deviate from it either to the right or left t

$$tg\psi = \frac{y_1 - y_2}{x_1 - x_2} = \frac{T_y}{T_x}\frac{H_{xx}}{H_{yy}} = tg\psi' = \frac{H_{xx}}{H_{yy}}$$

where ψ = angle between the projection of the axis of the pressure center on the horizon plane and the OX axis; ψ' = angle between the direction of the horizontal temperature gradi and the OX axis. *Subject Headings:* **1. Thermobaric field analysis 2. Upper air press variations.**—*I.L.D.*

12.10–266 551.509.313 551.511:551.513.1:551.510

Cressman, George P. (*U. S. W. B., Suitland, Md.*), **A diagnostic study of midtroposph development.** *Monthly Weather Review*, Wash., D. C., 89(3):74–82, March **1961.** 13 fi 9 refs., 4 eqs. **DWB, DLC**—An equation for vertical velocity is applied to data from 850, 5 and 200 mb for calculations of vertical velocity and divergence in special cases characteri by pronounced failures of barotropic forecasts. The results of the calculations show tha nondevelopment situation was adequately described by the equivalent-barotropic picture single quasi-horizontal surface of non-divergence. The onset of mid-tropospheric developm as shown by the appearance of large errors of the barotropic forecast, was characterized by appearance of a double surface of nondivergence, with a deep mid-tropospheric converge

layer in the vicinity of the trough line. This picture of development is confirmed by a second case study. The appearance of the mid-tropospheric convergence layer is related to the low level cold push, the tilt of the flow patterns with height, and the high level jet stream, confirming synoptic studies by J. J. GEORGE, H. RIEHL, and others. *Subject Headings:* **1. Barotropic forecast evaluations 2. Mid-tropospheric development.**—*Author's abstract.*

12.10–267 551.509.312

Gilchrist, Bruce, [**Comment on**] **Geirmunder 'Arnason: A convergent method for solving the balance equation** [**and**] **Reply by 'Arnason.** *Journal of Meteorology*, Boston, 16(3):344, June 1959. **DWB, DLC**—It is pointed out by GILCHRIST that the Leuristen proof of the solution of the balance equation presented by ARNASON (*see* 10.3–165, March 1959, *MAB*) applies only to the balance equation with the term $\Delta f \cdot \Delta c$ missing and not to the balance equation with the $\Delta f \cdot \Delta \psi$ term. ARNASON agrees with GILCHRIST'S correction. *Subject Heading:* **1. Balance equation.**—*I.L.D.*

12.10–268 551.509.312

†Henry, T. J. G., **A vertically-integrated thermotropic model.** *Canada. Meteorological Branch, CIR*-3177, TEC-297, March 25, **1959.** 16 p. 3 figs., 27 refs., 27 eqs. **DWB**—Prognostic equations are derived for an atmospheric model in which the horizontal wind field above the surface friction layer is assumed to be quasinondivergent and derivable from a stream function of the form $\psi = \bar{\psi} + A(P)\psi'$, where $A(P)$ is a function of pressure, to be determined empirically, and $\bar{\psi}$ and ψ' are independent of pressure. These assumptions lead to a Helmholtz equation for $\partial\psi'/\partial t$ and a Poisson equation for $\partial\bar{\psi}/\partial t$. Certain coefficients in these equations depend on the vorticity of the flow, and this dependence is investigated by assuming a very simple model of wind and stability. *Subject Headings:* **1. Thermotropic models 2. Prognostic equations.**—*Author's abstract.*

12.10–269 551.509.313:551.515.23

Birchfield, Gene E. (*Univ. Chicago*), **Numerical prediction of hurricane movement with the use of a fine grid.** *Journal of Meteorology*, Boston, 17(4):406–414, Aug. **1960.** 12 figs., 4 tables, 11 refs. **DWB, DLC**—A numerical model is described for integrating the barotropic prediction equations to obtain forecasts of the displacement of a hurricane center. The model employs a fine grid which is centered over the hurricane and covers only the vortex circulation. Forecasts for Connie and Diane (1955) and Betsey (1956) are presented. Reduction of truncation errors by the use of a smaller grid mesh results in improved trajectory forecasts. Run from another source as 9.11–141, Nov. 1958, *Met. Abs.*) *Subject Headings:* **1. Barotropic prediction equations 2. Hurricane movement forecasting 3. Numerical hurricane forecasting.**—*Author's abstract.*

12.10–270 551.509.313

Burger, Alewyn P. (*Mathematical Analysis Div., Nat. Physical Research Lab., Pretoria*), **First steps in dynamical weather prediction.** *South Africa. Weather Bureau, W.B.*, No. 25, **1960.** 48 p. 13 refs., mostly eqs. **DWB** (M09.313 B954fi)—The elementary aspects of the development of numerical weather forecasting techniques are outlined. The detailed dynamical prediction formulas are based on classical hydrodynamical equations that are modified and used in explaining and describing atmospheric circulation patterns. *Subject Headings:* **1. Dynamic weather forecasting 2. Numerical forecasting techniques.**—*N.N.*

12.10–271 551.509.33 551.509.313:551.513

Charney, Jule G. (*Inst. Advanced Study*), **Numerical prediction and the general circulation.** In: Pfeffer, Richard L. (*ed.*), **Dynamics of climate.** N. Y., Pergamon Press, **1960.** p. 12–17.) **DWB, DLC**—Antecedents of numerical prediction since World War I are surveyed up to the dynamical theory of general circulation. The problems of short range and long range predictions and of climatology are examined with their implications involved. Several other problems in their consequence are listed culminating in the question: Is the study of the climatology of the solar atmosphere a prerequisite to progress in the study of the terrestrial atmosphere? *Subject Headings:* **1. Numerical forecasting 2. General circulation.**—*O.T.*

12.10–272 551.509.313:551.557:551.542.

Dobryshman, E. M. and Nozadze, R. I., **O sviazi polei davleniia i vetra v barotropno atmosfere.** [Connection of pressure and wind fields in a barotropic atmosphere.] *Moscow Tsentral'nyĭ Institut Prognozov, Trudy*, No. 86:55–62, **1959.** 6 refs., 17 eqs. **DWB**—Prac tically all present schemes for short range forecasting with numerical methods are based on th use of the idea of quasi-geostrophic motion, creating disturbances in the field of the geostrophi wind, which is not affecting the meteorological processes. These disturbances often calle "meteorological noise," spread with the velocity of sound. The work of others on this prob lem, given in the references, are reviewed by the author with a suggestion to consider th Coriolis force, varying with the latitude, especially for short range forecasting. The field o motion for the whole thickness of the atmosphere is formulated by a linear system of differentia equations. The mathematical processes on simplification and integration of these equation are described in detail. The final equation for altitude (H) is given also in complicated integra form. *Subject Headings:* **1. Barotropic atmospheres 2. Numerical forecasting 3. Pressure wind field relationships.**—*N.P.S.*

12.10–273 551.509.313:551.524.

Gião, Antonio and Roulleau, Jean, **Le gradient vertical de température dans les champ barotropes.** [The vertical temperature gradient in barotropic fields.] *Académie des Science Paris, Comptes Rendus*, 251(15):1549–1550, Oct. 10, **1960.** 2 refs. **DWB, DLC**—In a baro tropic field, the vertical temperature gradient is limited to four well determined values. Th authors consider any field of pressure, temperature and entropy. In the vicinity of an arbitrar point A in this field, the isosurfaces of these three variables may be a priori arranged in suc a manner that any of them be situated in the acute angle of the two others. The variou possible dispositions are considered: a) the isobaric surface is comprised in the acute angle o the isothermal and isentropic surfaces; b) the isothermal surface is comprised in the acu angle of the isentropic and isobaric surfaces; c) the isentropic surface is comprised in the acu angle of the isobaric and isothermal surfaces. The vertical gradient is determined in each o these cases, and when adding to the values found the classical adiabatic value $-g/Cp$ whic corresponds to a spatially constant entropy, the "spectrum" of possible vertical gradient valu in a barotropic field is found: $-2g/Cp$; $-g/Cp$; $-g/2Cp$ and g/Cp where g=acceleration o gravity and Cp=specific heat at constant pressure. Since superadiabatic gradients and ter perature inversions correspond to abnormal conditions, $-g/2Cp$ is the most important val and equal to the half of the classical adiabatic gradient. *Subject Headings:* **1. Barotrop models 2. Vertical temperature gradient 3. Adiabatic processes.**—*A.V.*

12.10–274 551.509.324:551.576:551.5

Jenrette, James P. (*U. S. A. F., Chanute A. F. B., Ill.*), **A graphical technique of forecastin overcast skies and precipitation with Central Weather Facility products.** *American Meteor logical Society, Bulletin*, 42(2):110–117, Feb. **1961.** 16 figs., 2 tables, 6 refs. **DWB, DLC** A practical procedure for forecasting areas of overcast skies and precipitation is presente The forecast thickness field is relabeled as a forecast maximum precipitable water field. forecast actual precipitable water field is then graphically subtracted from this field to deri a forecast saturation chart. The forecast saturation chart is then adjusted with the foreca vertical motion field. Isopleths of critical values on the adjusted saturation chart outli forecast areas overcast skies and areas of probable precipitation. *Subject Headings:* **1. Vertic motion fields 2. Precipitation forecasting 3. Cloud forecasting.**—*Author's abstract.*

12.10–275 551.509.313:551.515.

Jones, Robert W. (*Univ. Chicago*), **The tracking of hurricane Audrey 1957 by numeric prediction.** *Journal of Meteorology*, Boston, 18(2):127–138, April **1961.** 13 figs., 2 tabl 16 refs. **DWB, DLC.** Also issued as: Chicago. University. Dept. of Meteorology, Co tract Cwb-9718, Technical Report, No. 11, March **1960.** 43 p. 13 figs., 6 tables, 15 re **DWB** (M15.2 C532te)—The two-level baroclinic steering model developed by Kasahara (196 for predicting hurricane trajectories is extended by taking account of the initial velocity of t hurricane. This model is applied to Hurricane "Audrey," 1957. The analysis of four-le data for Hurricane "Audrey," 1957, and the results of the "Audrey" forecasts are presente

Subject Headings: **1. Hurricane trajectory forecasting 2. Hurricane "Audrey" (1957) 3. Four-level data analysis.**—*Author's abstract.*

12.10–276 551.509.313:551.509.5

Knighting, E., **Numerical forecasts made with two- and three-parameter models.** *Meteorological Magazine*, London, 90(1,065):117–120, April **1961.** 2 tables, 4 refs. **DWB, DLC**—This paper presents the results of numerical forecasting tests, using three models, which were begun in the spring of 1960. The models used were: 1) a stream-function model which assumed that the wind field at 60 mb to be given by a stream function obtained from the contour height field; 2) a three-level model and 3) the Sawyer-Bushby model. The initial data used were the contour heights at specified geographical points in the North Atlantic and over Europe. The three-level model was found to be most successful comparing well with conventionally prepared forecasts at the higher levels, but slightly inferior at lower levels. *Subject Headings:* **1. Numerical forecasting 2. Forecast evaluation.**—*R.B.*

12.10–277 551.509.313:518.4

Lilly, D. K. (*U. S. W. B., Wash., D. C.*), **A proposed staggered-grid system for numerical integration of dynamic equations.** *Monthly Weather Review*, Wash., D. C., 89(3):59–65, March **1961.** 2 figs., 2 tables, 14 refs., 17 eqs. **DWB, DLC**—A system is proposed for grid allocation and differencing of apparently general applicability to purely marching-type systems of equations of fluid dynamics. The method is based on casting the equations into the conservation form, which then permits use of a staggered space-time grid system with interpolations required only in certain linear terms. The method is illustrated by application to two systems of equations, on one of which numerical experiments have been successfully performed. Advantages and drawbacks to the method are described in comparison to other currently used grid systems, and the possibility and desirability of parametric simulation of turbulent eddy exchange processes are discussed. *Subject Headings:* **1. Staggered space-time grid systems 2. Turbulent eddy exchange 3. Numerical integration of dynamic equations.**—*Author's abstract.*

12.10–278 551.509.313:551.509.33

Mashkovich, S. A. and Kheĭfets, Ia. M., **K teorii dolgosrochnogo prognoza s uchetom vertikal'noĭ stratifikatsii atmosfery i turbulentnogo peremeshivaniia.** [Theory of long range forecasting with consideration of the vertical stratification of the atmosphere and turbulent mixing.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 93:3–15, **1960.** fig., table, 5 refs., 50 eqs. **DWB**—The hydrodynamic theory of long range forecasting has undergone substantial development. The present article describes the solution of a given system of equations for a long range forecast taking into account the data for three levels of the atmosphere. In the equation of the entry of warm currents, the horizontal turbulent large scale mix is taken into account. The balance of the paper is devoted to a mathematical discussion divided into six separate sections: 1) conclusions reached in the solution of the problem, 2) limiting conditions and initial data, 3) transformation of system of equations, 4) solution of the equations, 5) determination of arbitrary constants, 6) verification of the stability of the solution. Data in tabular form is provided for the typical equation. *Subject Headings:* **1. Long range forecasting 2. Stratification of atmosphere 3. Turbulent mixing.**—*M.B.B.*

12.10–279 551.509.313

†Phillips, Norman; Blumen, W. and Coté, O. (*all, M. I. T.*), **Numerical weather prediction in the Soviet Union.** *American Meteorological Society, Bulletin*, 41(11):599–617, Nov. **1960.** 1 figs.; 2 tables, 86 refs., 83 eqs. **DWB, DLC.** Also issued in mimeograph form, April **1960.** 1 p. **DWB** (M09.312 P562nu)—This article gives a review of the research done in the Soviet Union through 1959 on the theory and practice of numerical weather prediction by hydrodynamic methods. Russian meteorologists have used the same geostrophic forecast system as have other meteorologists, and have carried out a limited number of test forecasts with electronic computers. Comparatively little work seems to have been done so far in objective weather map analysis, general circulation experiments, and the use of non-geostrophic equations. In the bibliography, articles available in English transl. are indicated. *Subject Head-*

ings: **1. Numerical forecasting 2. Hydrodynamic methods of forecasting 3. U.S.S.R.**—*Authors' abstract.*

12.10–280 551.509.313:551.584.2:551.515.

Sasaki, Yoshikazu, **Study of mesoscale disturbances in the atmosphere by numerica methods.** Texas. Agricultural and Mechanical College. Dept. of Oceanography an Meteorology, Research Grant NSF-G7417, Annual Report, March 1, 1959–Feb. 29, 1960 26 figs., 3 tables, 10 refs., 17 eqs. **DWB** (M(051) T355ann C.1)—This report summarize studies which were made during the period March 1, 1959 through Feb. 29, 1960 under Nationa Science Foundation Research Grant NSF-G7417. The major effort during the past year ha been toward the development of objective analysis and prediction methods which are applicabl to investigations of mesoscale disturbances (these disturbances are found on a scale whic roughly covers 10 to 200 n mi). The numerical methods have been carefully tested an improved in order to sufficiently reduce the numerical errors. Some of the results obtaine from these schemes are shown in the report. Included are wind field properties obtained fro the objective analysis scheme, and the *p*-velocity, specific volume patterns and precipitatio areas from the prediction scheme. The results obtained from the objective analysis schem have not been verified; therefore, no conclusions are presented concerning them. The resul obtained in the experiments with the prediction scheme showed clearly the formation of double frontal zone from a single frontal zone, and also the development of a precipitation are Finally, a discussion is presented based on these results concerning the kinematics of prefront squall-line formation at the incipient stage. *Subject Headings:* **1. Mesoscale disturbance 2. Squall line formation 3. Objective forecasting techniques.**—*Author's abstract.*

12.10–281 551.509.313:551.509.324:551.574

Smagorinsky, Joseph (*U. S. W. B., Wash., D. C.*), **On the dynamical prediction of larg scale condensation by numerical methods.** *American Geophysical Union, Geophysical Mon graph*, No. 5:71–78, **1960.** 4 figs., table, 15 refs., 22 eqs. **DWB, DLC**—The paper discuss properties of the hydrothermodynamic frameworks thus far employed, the approximatio regarding the microphysics of precipitation, the quality of results of numerical integrations f different models, further work in the construction of more sophisticated dynamical mode and investigations of the relation of large-scale liquid water content and of water vapor, and th implications for the dynamical prediction of cloud formation and dissipation. *Subject Hea ings:* **1. Precipitation microphysics 2. Cloud formation forecasting 3. Condensation physi 4. Precipitation physics 5. Condensation forecasting 6. Numerical forecasting methods.** *Author's abstract.*

12.10–282 551.509.313:551.509.33:551.583.

Von Neumann, John (*Atomic Energy Commission*), **Some remarks on the problems forecasting climatic fluctuations.** (In: Pfeffer, Richard L. (*ed.*), **Dynamics of climate.** N. Y Pergamon Press, **1960.** p. 9–11.) **DWB, DLC**—The hydrodynamical and computation approach is emphasized for forecasting climatic fluctuations. The motions of the atmosph are divided into three groups: one of them determined by the initial condition, the second o practically independent of it, and a third category between these two extreme cases for foreca ing over periods from 30 to 180 days. Considering the problem of forecasting long peri fluctuations of general circulation, the details of the computation are of critical importan *Subject Headings:* **1. Long range forecasting 2. Climatic fluctuation forecasts.**—*O.T.*

Statistical Forecasting (551.509.314)

12.10–283 551.509.314:551.515:519.24

*†Ostby, Frederick P. and Veigas, Keith W., **A moving-coordinate prediction model appli to east coast cyclones.** The Travelers Weather Research Center, Hartford, Conn., Contr AF (604)-5207, Scientific Report No. 1, Nov. **1960.** 75 p. 16 figs., 12 tables, 28 refs. **DWB** A statistical prediction technique to forecast the behavior of east coast cyclones is develop using multiple linear regression analysis. The predictands are the 24-hr northward and ea

ward displacements of the cyclone, the 24-hr change in central pressure, and the 24-hr change in intensity. The sample consists of 352 cyclone cases. A major feature of the technique is that a *moving* coordinate system is employed: the observed and derived predictor information is measured *relative* to the cyclone center rather than at fixed geographical locations. Two sets of multiple linear regression prediction equations are derived. The first uses point values of sea-level pressure, 500-mb height, 1000–500-mb thickness, and 12-hr changes of these variables. The second set includes, in addition to the above variables, numerous complex quantities, such as steering components, gradients, vorticity and thickness advection, and thermal wind. When applied to 106 independent cases, the point value equations yield a vector position RMSE of 4.01° latitude and a central pressure RMSE of 8.70 mb. The complex equations fail to improve these scores significantly. Operational 24-hr forecasts made for 31 cases during the winter of 1959–1960 are compared with 18-hr NWAC forecasts. The statistical forecasts incur a RMSE of 2.25° lat. for position and a RMSE of 8.14 mb for deepening; NWAC forecasts incur a RMSE of 3.87° lat. and a RMSE of 7.25 mb. In 24 of the 31 forecasts of cyclone location, the statistical predictions achieve better results than the NWAC predictions; in 13 of the 31 forecasts of central pressure, the statistical predictions incur smaller errors. *Subject Headings:* **1. Cyclone forecasting 2. Statistical forecasting 3. Multiple regression techniques.**—*Authors' abstract.*

Upper Air Information (551.509.317)

See also: **Atmos. macro-processes causing monthly temp. anomalies, European U.S.S.R.** (Pagava et al.), 12.10–27.

12.10–284 551.509.317:551.509.324.2:551.515:551.578.45

§Bailey, R. E., **Forecasting of heavy snowstorms associated with major cyclones.** (In: George, J. J. et al., **Weather forecasting for aeronautics.** N. Y., Academic Press, **1960.** p. 468–475. 7 figs.) **DLC**—This ch. deals with forecasting heavy snowstorms using pressure (700 mb and 850 mb), temperature and wind conditions. The procedure for use of these parameters is described in detail and an example (Dec. 13, 1953) is included. Synoptic charts and graphs are given to illustrate and amplify the text. A work-sheet for heavy snowstorms is appended. *Subject Headings:* **1. Heavy snowstorm forecasting 2. Snowstorm-cyclone relationships.**—*A.J.M.*

12.10–285 551.509.317

§Berlin. Freie Universität. Institut für Meteorologie und Geophysik, **Höhenkarten, 10 mb.** [Upper air charts, 10 mb.] Jan. 5–May 17, **1960.** 31 charts. **DWB** (M09.21 B515ho 10 mb). Also its **Höhenkarten, 30 mb.** [Upper air charts, 30 mb.] Jan. 5–May 13, **1960.** 30 charts. **DWB** (M09.21 B515ho 30 mb)—The stereographic polar projection charts of the northern atmosphere on a scale of 1:125,000,000 at 60°N include the constant pressure charts of daily observations in 3 to 5 day intervals, sometimes supplementary charts to show the alternating factors of records received later, and sometimes even an altitudinal variation of the layer of a five day period. For almost every map the main changes are indicated in an accompanying explanatory text. *Subject Headings:* **1. Upper air charts 2. Stereographic polar projection charts.**—*O.T.*

12.10–286 551.509.317

Boyden, C. J. (*Asst. Dir: Central Forecasting, Met. Office*), **The use of upper air charts in forecasting.** *Marine Observer*, London, 30(187):27–31, Jan. **1960.** 5 figs. **DLC**—In recent years the use of upper air charts in forecasting has increased. Surface charts are not useful in forecasting beyond a few hours. The upper air charts are drawn, not at fixed heights, but for standard pressure levels. Two of the most useful pressure levels are 500 mb (18,000 ft) and 300 mb (30,000 ft). All movements and development of pressure systems occur because the wind does not match the pressure gradient. The forecast of upper air currents is made by applying laws of fluid motion to the upper atmosphere. *Subject Heading:* **1. Upper air charts.**—*A.H.K.*

12.10–287 551.509.317:551.515.8:551.557.5

Galloway, J. L. (*Met. Service, Canada*), **The three-front model, the developing depression and the occluding process.** *Weather*, London, 15(9):293–309, Sept. **1960.** 9 figs., 27 refs. **DLC** (QC851.W4)—A general review is given of previous work on development theories and the relative positions of surface depressions and the features of the upper flow, in particular the position of developing lows in relation to the axis of the jet stream. Particular mention is made of a prophetic paper by Ryd written in 1927. Depressions are known to pass under the axis of the jet during their lifetime. When they do so they must be occluded. Furthermore as the jet cannot be intersected by the crest of the warm air aloft it is concluded that the jet must be associated with the fronts of a warm sector of higher i.e., a further frontal system to the south. A closer analysis of the jet stream may on some occasions show a double structure to the jet. The conception of the three-front may help to a better understanding of these processes. A detailed analysis has been made of the charts for 13–16 June 1958 for the Canadian region to illustrate the redevelopment of a low on the north side of the jet. *Subject Headings:* **1. Depressions 2. Jet streams 3. Three front models 4. Occlusions.**—*R.B.*

12.10–288 551.509.317:551.511.2:551.513.1

Huber-Pock, Franz (*Vienna*), **Ein weiterer Beitrag zur Vereinfachung der graphischen Integration der barotropen Wirbelgliechung.** [A further contribution to simplifying the graphical integration of the barotropic vorticity equation.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 12(1):17–23, **1960.** fig., table, 5 refs., 5 eqs. German English and French summaries p. 17. **DLC**—In a previous paper it was shown that the computation of the geopotential field from a given vorticity distribution by means of the Fjørtoft method of graphical integration of the barotropic model may be improved by the introduction of statistical considerations. The present paper deals with the same subject, however expanded by kinematical considerations which eventually lead to a further simplification of the routine procedure. The application to an actual weather situation indicates that the statistical as well as the statistical-kinematical method render a certain improvement of the results. *Subject Headings:* **1. Barotropic vorticity equations 2. Fjørtoft's graphical method.**—*Author's abstract.*

12.10–289 551.509.317:551.547.

*Mulkern, Florence Seaver and Cooley, Duane S. (*both, GRD, Air Force Res. Div.*) **Verification of statistical hemispherical predictions.** *Journal of Meteorology*, Boston, 18(1):50–59, Feb. **1961.** 8 figs., 8 tables, ref., 2 eqs. **DWB, DLC**—A statistical procedure for forecasting the 500 mb contour height at grid points around the hemisphere is verified. Coefficients of Tschebycheff polynomials are used as predictors, and these are tested on an independent data sample. The results indicate satisfactory 24 hr forecasting value but less value when predictions are extended to 48 or 72 hrs. *Subject Headings:* **1. Forecasting 500 mb contour height 2. Statistical forecasting.**—*Authors' abstract.*

12.10–290 551.509.317:551.515.12

Ōta, Morizo (*Kobe Marine Obs.*), **On the analysis of the extraordinary development of upper trough in the vicinity of Japan during March 7–10, 1957.** *Umi to Sora* (*Sea and Sky*) Tokyo, 34(2):35–39, **1958.** 4 figs., 7 refs., 3 eqs. In Japanese; English summary p. 39 **DLC**—During March 7–10, 1957, a remarkable cyclone developed in the vicinity of Japan On March 7, sudden cyclogenesis occurred in the East China Sea; on March 8, this developing cyclone passed off the south coast of Japan, and resulted in a storm of large dimensions far off the east coast of Japan on March 9–10. The author investigated, extending the theories of Fjørtoft, Estoque, Bjerknes and Holmboe, the errors of numerical prediction and the distribution of horizontal divergence of the contours at the 500 mb surface associated with the above mentioned cyclone phenomenon. In conclusion it is noted that the effect of horizontal divergence is important in considering numerical weather prediction by the vorticity equation. *Subject Headings:* **1. Numerical forecasting 2. Vorticity equations 3. Cyclogenesis 4. Japan** —*K.C.*

12.10–291 551.511.3:551.509.31

Pichler, Helmut (*Vienna*), **Zeitliche und räumliche Mittelbildungen bei Rossby-Wellen** [Time and space averaging in the case of Rossby waves.] *Archiv für Meteorologie, Geophysi*

und Bioklimatologie, Ser. A, Vienna, 12(1):8–16, 1960. 3 figs., 6 refs., 12 eqs. German, English and French summaries p. 8–9. **DLC**—The investigation is based upon a relation found by H. REUTER which correlates space and time means in a geopotential field. Conditions for the validity of the mentioned relation in the case of ROSSBY waves are presented in diagrams. Therein, the magnitude of the grid distance by which space means were calculated renders to depend essentially on the phase velocity of ROSSBY waves. It can be demonstrated that the diagrams are of considerable value for the construction of prognostic charts. In the case of a nonstationary planetary wave system it is possible to decide, by means of the zonal wind component, which grid distance has to be used for calculating the space means. *Subject Headings:* **1. Rossby waves 2. Prognostic charts 3. Zonal wind component.**—*Author's abstract.*

12.10–292 551.509.317:551.513.1:551.557

Probert-Jones, J. R., **Conservation of vorticity at 100 millibars.** *Great Britain. Meteorological Office, Scientific Paper*, No. 2, 1960. 13 p. 14 figs., 2 tables, 4 refs. **DLC**—Five sequences of charts were chosen from the winter periods, Nov.–April 1953–1956 on occasions when there was a strong flow over the British Isles and a well marked feature in the flow pattern. The original working charts were redrawn in an attempt to see whether the (geostrophic) absolute vorticity could be conserved in the motion. Fjørtoft's graphical technique was used. The modified set of charts is smoother in time with respect to height and significantly smoother with respect to wind than the original set. The observed winds are fitted better by the modified charts, although the heights are fitted better by the original set. It is concluded that the evidence supports the hypothesis of nondivergent flow at the 100 mb level. *Subject Headings:* **1. 100 mb charts 2. Vorticity conservation 3. Fjørtoft's graphical method.** —*R.B.*

LARGE SCALE SYNOPTIC PROCESSES (551.509.318)

See also: **Prediction of various types of precip. in cold season, Ukraine** (Volevkha), 12.10–340; **Statistical theory of met. measurements and predictions** (Gleeson), 12.10–369.

12.10–293 551.509.318:551.542

Aksarina, E. A., **Tipy baricheskikh poleĭ nad Tatarskim prolivom v ianvare–aprele.** [Types of pressure fields over the Gulf of Tatary in January–April.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:102–112, 1960. 2 figs., 4 tables. Russian summary p. 112. **DWB**—In order to obtain more accurate knowledge of synoptic processes over the Gulf of Tatary so as to forecast the pressure field 2–3 days in advance the author established types of pressure fields and their characteristics (frequency, stability, succession) on the basis of synoptic surface maps and maps of cyclone trajectories during 1949–1958 for the months of January to April. The types of pressure fields were constructed on the basis of direction isobars and gradients of the Gulf of Tatary and adjoining regions. The pressure type was referred to a given type if the character of the field did not vary during 24 hours; if it did vary, it was referred to a mixed type. Twelve types were established viz: (1) northerly, (1-a) northerly intense; (2) northwesterly; (3) westerly; (4) southwesterly; (5) northeasterly; (5-a) northeasterly intense; (6) easterly; (6-a) easterly intense; (7) southeasterly; (8) southerly; (9) cyclonic, (9-a) cyclonic intense; (10) anticyclonic; (11) anticyclonic intense; (12) mixed. Data are presented on the mean frequency of types of pressure fields; the maximum number of days with continuous duration of types by months, stability of types of pressure fields by months, and succession (in %) of types of pressure fields in 1949–1958. In all months pressure fields of slight gradients are most frequent; in January and February the slight gradient is accompanied by a large frequency of the northerly type. *Subject Headings:* **1. Pressure field forecasting 2. Pressure field classification 3. Gulf of Tatary.**—*I.L.D.*

12.10–294 551.509.318:551.510.7(235.1)

Amineva, T. P., **Radioaktivnost' vozdukha v sviazi s meteorologicheskimi usloviiami v raĭone El'brusa.** [Radioactivity of the air in relation to meteorological conditions in the Elbrus region.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 6:898–902, June 1960.

6 figs., 3 tables, 13 refs. **DWB, DLC**—The author presents the results of measurements of atmospheric radioactivity carried out at stations of the Elbrus Expedition in order to establish relationships between radioactivity and various meteorological conditions and electrical conductivity accompanying the composition of samples. The greatest amount of atmospheric radioactivity was associated with a dry soil surface and the least with a snow covered surface. Maximum radioactivity was observed with southeasterly winds and minimum with northerly and westerly winds. Increased radioactivity corresponded to increased absolute humidity. The variation in daily radioactivity between the observatory (2140 m above sea level, at the bottom of a valley) and Terskol Peak are shown to be influenced by mountain valley winds and snow cover. The degree of radioactivity was found to be similar at the soil surface and at 13 m above the soil. The direct proportionality between radioactivity and air temperature is explained by the fact that low temperatures occur during winter when the ground is covered with snow. The fundamental factor of ionization of the atmosphere at the surface of the earth is exhalation of radioactive emanations from the earth; cosmic radiation plays a secondary role. *Subject Headings:* **1. Atmospheric radioactivity measurements 2. Elbrus Mts., Georgian S.S.R.** —*I.L.D.*

12.10–295 551.509.318:551.524.32(573)

Barabashkina, A. P., **Teplye i kholodnye sezony leta v Primor'e i na Sakhaline.** [Warm and cold seasons in summer in the Maritime Territory and in Sakhalin.] *Dal'nevostochnyy Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:38–67, 1960. 14 figs., 5 tables, 18 refs. Russian summary p. 65–66. **DWB**—The author analyzes the synoptic causes producing deviations of mean monthly atmospheric temperatures in May–August from the normal and establishes presynoptic indicators enabling the forecasting of a temperature anomaly over the Maritime Territory and Sakhalin 2 to 3 months in advance. Material on temperature anomalies, synoptic maps and synoptic kinematic maps for the period 1933–1957, maps of pressure topography and mean AT_{500} maps of natural synoptic periods and months for 1949–1957 were used. During the warm and cold seasons more than 50% of the days have atmospheric temperature anomalies of appropriate sign. These seasonal temperature anomalies are the result of a repetition of particular types of synoptic processes. During the warm and cold seasons of the first half of the year three groups of processes were established. The cold season of the second half of the year is characterized by 3 groups of processes and the warm season by 4 groups. The below normal temperatures in the summer months are produced by advective transport of cold maritime air over the region under investigation. The synoptic processes, moreover, are characterized by intense anticyclonic activity over the Okhotsk and Japan Seas and by cyclonic activity over the Amur basin; the Okhotsk anticyclones are localized usually over the western part of the sea. A positive temperature anomaly is produced by synoptic processes characterized by west-east transport of pressure formations in moderate latitudes and a reduction in anticyclonic activity over the Sea of Okhotsk; the Okhotsk centers are displaced usually over the eastern part of the sea. Indicators for forecasting temperature anomalies in the first half of the summer (May–June) were obtained in January–February and for the second half of the summer (July–August) in April. A weaker cyclogenesis was observed in January, before a warm May and June, over the Sea of Okhotsk than before a cold May and June. A positive deviation of the circulation index of more than 20 units from the normal indicates the occurrence of a cold first summer half and negative deviation a warm summer half. In April the mean period AT_{500} maps show more meridional flow before cold seasons of the second half of the year than before the warm seasons. Before cold seasons the number of days in April with negative deviations of the index from the normal exceeds the number of days with positive deviations; before warm seasons the relationship is reversed. Before normal seasons the number of days with the various deviations is almost the same. *Subject Headings:* **1. Temperature anomaly forecasting 2. Seasonal temperature anomalies 3. Synoptic conditions for temperature anomalies 4. Maritime Territory, Asiatic U.S.S.R.** —*Transl. of author's summary & I.L.D.*

12.10–296 551.509.318:551.510.41:541.45

Bell, Gordon B., **Meteorological conditions during oxidant episodes in coastal San Diego County in October and November, 1959.** Berkeley, Calif., State of Calif., Dept. of Publ

Health, Bureau of Air Sanitation, May 23, 1960. 19 p. 9 figs., table.—A study was undertaken of meteorological factors to determine the role during abnormal oxidant concentrations measured at coastal points in San Diego County. Evaluation was made of regional and local air circulation patterns, temperature inversion conditions and marine air stability over coastal waters. The wind trajectories for air parcels present in Oceanside and San Diego were also estimated. This publication reports the details of the study, discusses the results and gives graphical representations of the data. *Subject Headings:* **1. Meteorological conditions during oxidant concentration 2. Atmospheric pollution 3. San Diego, Calif.**—*I.S.*

12.10–297 551.509.318:551.524.32(47,571)

*Bliumina, L. I., **Usloviia formirovaniia teplykh i kholodnykh aprelei na Evropeĭskoĭ territorii SSSR i v Zapadnoĭ Sibiri i nekotorye priznaki dlia ikh prognoza.** [Conditions for the formation of warm and cold Aprils in the European U.S.S.R. and in Western Siberia and some criteria for their forecasting.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 92:31–51, 1960. 5 figs., 14 tables. **DWB**—In order to determine the conditions of formation of the April temperature regime and the variation and in order to establish forecasting indicators the author analyzed the mean monthly atmospheric temperature fields over the European U.S.S.R. and Western Siberia for data of 24 meteorological stations for the period 1891–1958. An analysis of the temperature anomalies for April resulted in the establishment of four types of anomalies, also 7 types of synoptic processes were found to characterize warm and cold Aprils. An analysis of the relationships between the mean monthly temperature anomaly of April and each of the preceding months of the year was carried out for each station. For most months, Δt (mean monthly temperature anomaly) was slightly related to the Δt of the following April. January and April showed the highest relationship in the European U.S.S.R. and October and April the highest for Western Siberia. The distributions of the relationship varied graphically and were unstable in time. An analysis of the inverse relationship between the variation of January–April temperature anomalies and solar activity (Wolf number) showed that the relationship between Januaries and succeeding Aprils, which increased in the first half of the 68 year series and decreased in the second half, may be intensified in the next 20–30 years in the presence of increased solar activity. The relationship of Δt of individual months with Δt of the succeeding April, taking into account the Wolf numbers, is examined. *Subject Headings:* **1. Temperature field forecasting 2. Mean monthly temperature anomalies 3. Solar influences 4. European U.S.S.R. 5. Siberia, Asiatic U.S.S.R.**—*I.L.D.*

12.10–298 551.509.318:551.524.32(47,571)

Borisova, L. G., **Sinoptiko-klimatologicheskie sviazi atmosfernykh protsessov i anomalii temperatury noiabria.** [Synoptic-climatological relationships between atmospheric processes and temperature anomalies in November.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 92:113–143, **1960.** 7 figs., 10 tables. **DWB**—The author investigated the synoptic climatic characteristics of November and developed forecasting indications for the formation of synoptic processes and anomalies of the mean monthly temperature for this month with special reference to the European U.S.S.R. and Western Siberia. The contents of this study include the following: a summary of long period monthly temperatures; monthly precipitation and freezing conditions for November; types of synoptic processes in November and their frequency; relationship between the intensity of solar activity and the nature of the synoptic processes, whereby the Wolf number is used as index of solar activity; mean long period and mean monthly anomalies of atmospheric temperatures in November; the relationships between mean monthly temperature anomaly of November and solar activity; monthly temperature forecast for November; forecast of synoptic processes in November; influence of solar activity upon the frequency of September processes in November; forecast of mean monthly atmospheric temperature anomalies for November; influence of solar activity in the state of the relationships of mean monthly September and November temperature anomalies and the causes of their instability; the forecasting relationships between anomalies of mean monthly temperature for November and the temperature anomalies of preceding months (April, September, January) and the Wolf number; and the spatial distribution of the relationships over the European U.S.S.R. and Western Siberia. Extensive numerical data and synoptic maps are presented. The probability of the relationships of the successive development of September processes in

November varies for different types of atmospheric circulation processes. Processes of la tudinal circulation and incursion of anticyclones from the northwest across the Scandinav peninsula (Type 5) and from Iceland (Type 7 and 7b) have the highest probability (74–76% transpolar processes have the least probability (33%). When the values of solar activ (within the limits of accepted intervals) in September and November correspond the probabil of synoptic processes is 10% higher. During the epoch of minimum solar activity the pro bility of coincidence of September latitudinal processes in November increases to 12%. T stable forecasting indicators of the relationship of mean monthly temperature anomalies various preceding months are as follows: During maximum solar activity ($W \geqslant 65$) over European U.S.S.R. the greatest similarity is presented by the distribution of the anomaly warm or normal in the temperature relationship of April and the succeeding November ($\rho = 0.$ probability 76%); for a warm April separately the value of the relationship increases ($\rho = 0.$ probability 89%). For Western Siberia the best relationship of the anomaly of mean mont November air temperature is also a warm or near normal April ($\rho = 0.39$, probability 91% For the European U.S.S.R. during the epoch of minimum solar activity ($W \geqslant 25$) the great probability is the relationship of the anomaly of September and November ($\rho = 0.34$, probabil 76%); for a warm September separately the anomaly relationship increases ($\rho = 0.65$, pro bility 100%). For Western Siberia the best relationship is that of the warm and near norm April and November ($\rho = 0.24$, probability 84%). *Subject Headings:* **1. Synoptic climatol 2. Mean monthly temperatures 3. Synoptic processes for temperature anomalies 4. Europe U.S.S.R. 5. Siberia, Asiatic U.S.S.R.**—*I.L.D. & author's conclusions.*

12.10–299 551.509.318:551.578.46(47

Burtsev, D. A. and Strizhkova, E. M., **Nekotorye kharakteristiki i sinopticheskie uslov formirovaniia i skhoda snezhnogo pokrova v gorakh Kryma.** [Some characteristics and synoptic conditions of snow cover formation and dissolution in the mountains of Crime *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 12:1 122, **1958.** 4 figs., table, 5 charts, 9 refs. **DWB**—Snow cover in Crimea is the exclusiv important factor in feeding Crimean rivers, especially in the period of late winter and ea spring months. It is well known that the winter in Crimea is characterized by four thaw periods, at time of which the accumulated snow is thawing and creates the additional runof the rivers. In certain winters this process produced winter flash-floods. The characteri of snow cover in Crimean mountains is described and discussed. The map showing the tribution of snow cover in Crimea illustrates discussion. The maximum snow reserve physical properties are considered. Synoptic conditions to formation of stable snow cover those of melting of it are discussed. Deductions from the study are made in the conclus Besides the map the article is illustrated with 3 graphs, a short table and enclosed table of results of snow surveys for the period 1952–1957. *Subject Headings:* **1. Synoptic conditi for snow cover formation 2. Snow cover 3. Crimean mountains.**—*B.J.G.*

12.10–300 551.509.318:551.515.23(26

Barabashkina, A. P. and Leskova, E. A., **Issledovanie taĭfunov, vykhodiashchikh Iaponskoe more i Primorskiĭ kraĭ.** [Investigation of typhoons entering the Sea of Japan the Maritime Territory.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicha Institut, Trudy*, No. 3:3–32, **1958.** 13 figs., 6 tables, 6 refs. **DWB**—The appearanc typhoons over the Sea of Japan and the Maritime Territory as well as the method of forecas them are outlined. Typhoons crossing the Sea of Japan are divided into three types: t coming from the Pacific, those passing through the Yellow Sea and Korea; and those co from the south and reaching the Japanese islands. Most of the typhoons after reaching north of Japan are regenerated by the cold front. The typhoons moving toward China characterized by conservation of high pressure area near the ground as well as in the u atmosphere over the Yellow Sea. The signs of a dwindling typhoon are its shallow dep stationary frontal zone at latitudes of 45–60° and an anticyclone belt over China. Var disposition of plotted curves make it possible to determine the path a typhoon will follow 1 3 days in advance. *Subject Headings:* **1. Typhoon forecasting 2. Sea of Japan 3. Marit Territory, Asiatic U.S.S.R.**—*S. Nowinska.*

12.10–301 551.509.318:551.575.1(529)

Chi, C. H., **Some types of air-mass fogs around Taiwan,** *Meteorological Bulletin,* Taipei, Formosa, 2(3):15–24, Sept. **1956.** 7 figs., 2 tables, 4 refs. In Chinese. **DLC** (Orientalia)—Fogs having the most effect on air and sea travel around Taiwan were classified into three types: radiation fog that includes ground and continental high inversion fog; advection fog that includes sea and tropical-air, and a combination type fog that subclassified under a coastal high-inversion, steam, advection-radiation, upslope, frontal and ice fog. Four examples, which were related to stratus in their formation, were selected for analysis. The author found that around Taiwan pure radiation and advection fogs rarely occur, otherwise radiation-advection involved in tropical-air, fog at land was of important effect, and that continental high-inversion was predominant in the north in winter; coastal high-inversion in the early spring, sea-fog in the northwest in spring. Fog season begins in October and ends in June, generally. *Subject Headings:* **1. Fog classification 2. Fog forecasting 3. Formosa.**—*K.C.*

12.10–302 551.509.318:551.576.2

Curtis, Robert C. (*Geophysics Research Directorate*), **Studies of large-scale cloudiness in the Northern Hemisphere.** *U. S. Air Force. Cambridge Research Center, GRD Research Notes,* No. 36:23–30, June **1960.** 2 figs. **DWB**—Various studies of large scale cloudiness in the Northern Hemisphere are reported. Some of these have been completed and some are still under way. The analyses of cloud cover and the occurrence of precipitation on the six-hourly Northern Hemisphere and the three-hourly North American weather charts, and graphical records of the daily values of total sky cover at 1200 Z for the year 1956 for 29 stations have been completed. The studies being conducted concern the relationships of the large-scale cloud patterns to the synoptic features and the use of these patterns in forecasting cloudiness. The results of the completed studies and the interrelationship between studies of large- and small-scale cloudiness are also discussed. *Subject Headings:* **1. Large scale cloudiness 2. Cloudiness forecasting 3. Northern Hemisphere.**—*I.S.*

12.10–303 551.509.318:551.579.4(540)

Dhar, O. N. (*Met. Off., New Delhi*), **Meteorological situations associated with actual major floods in different parts of India.** (In: Symposium on Meteorological and Hydrological Aspects of Floods in India, New Delhi, April 1958, **Proceedings.** Delhi, Indian Meteorological Dept., **1959.** p. 57–62. fig.) **DWB** (M79.4 S989pr)—Important floods that have occurred in different parts of the country from the year 1920 onwards have been studied in relation to the attendant meteorological situations and the results of the study are presented in this paper. *Subject Headings:* **1. Meteorological conditions for floods 2. Floods, India 3. India.**—*Author's abstract.*

12.10–304 551.509.318:551.515.82

Dziuba, V. K., **Polozhenie planetarnoĭ vysotnoĭ frontal'noĭ zony v techenie zimnikh sinopticheskikh periodov nad Vostochnoĭ Azieĭ.** [Situation of the planetary upper frontal zone over East Asia during winter synoptic periods.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Institut, Trudy,* No. 10:113–116, **1960.** table, 2 refs. **DWB**—This paper is devoted to an investigation of the position of planetary frontal zones aloft during natural synoptic periods and in the course of the alternation of the latter; and of the possibility of employing constant seasonal isohypses for fixing the position of planetary frontal zones of natural synoptic periods during the winter natural synoptic seasons over East Asia (between 80°N lat. and 0°S lat., and 60°W long. and 180°E long.). Synoptic kinematic maps of the position of planetary frontal zones by natural synoptic periods of the winter natural synoptic seasons for 1954–1958 were constructed. The position of planetary frontal zones was fixed by means of an axial line, which was determined visually in the zone of maximum gradients of the geopotential. Each natural synoptic period was characterized by a particular planetary frontal zone of which three types were distinguished. In Type I the planetary frontal zones are over the continental region of East Asia, oriented latitudinally and over the seas from south to north; here belongs planetary frontal zones with ridges and troughs rapidly moving from west to east. Type II contains planetary frontal zones with quasistationary and gradually intensifying ridges oriented from Siberia to Taimyr and the northwest regions of Yakutia. Type III contains two planetary

frontal zones: one oriented from the Altai to the southeast, to the Sea of Japan and north acro the Japanese Islands to the northwest Pacific Ocean; and the other extending from west to ea along the northern region of East Asia. In 77% of the cases the dates of boundaries of natur synoptic periods and the variations of the positions of planetary frontal zones either coincid or differed by one day. The most frequent changes of position of planetary frontal zones we over the Krasnoyarsk Territory and Yakutia. *Subject Headings:* **1. Planetary frontal zon 2. Natural synoptic periods 3. Winter synoptic periods 4. East Asia.**—*I.L.D.*

12.10–305 551.509.318:551.577.38(584.

§*Fel'dman, Ia. I., **Osobennosti zasushlivoĭ i vlazhnoĭ v raĭonakh tselinnykh i zaleshny zemel' severnogo Kazakhstana i Altaĭskogo kraia.** [Peculiarities of arid and humid weather reclamation lands of northern Kazakhstan and Altai Territory.] (In: Akademiia Nauk SSS Institut Geografii, **Gidroklimaticheskiĭ rezhim lesostepnoĭ i stepnoĭ zon SSR v zasushlivy vlazhnye gody.** Moscow, **1960.** p. 147–169. 7 figs., 11 tables, 6 refs.) **DWB** (M79 A313 —Drought in the regions of the virgin and fallow lands of northern Kazakhstan and t Altai Territory are the result of the fact that during the growing season these regions recei two to three times more solar radiation heat than that expended in evaporation of the annu precipitation of these regions. The remaining heat, i.e., that which is not expended in evapo tions, warms the lower layer of the atmosphere so that frequently sukhovei-drought weath occurs during May–August. The unfavorable relationships of heat and moisture duri growing seasons of the abnormally dry years of 1951 and 1955 were manifested as a hi frequency of sukhovei winds and as a very small amount of precipitation. The moist coefficients in the steppe zone regions were two-three times less than the average long per values and four-five times less than during the abnormally humid year of 1954. The v favorable meteorological conditions of the fall, winter and spring preceding the 1951 and 19 droughts were characterized by small amounts of precipitation, shallow snow cover and hi atmospheric temperatures in spring. The latter caused an early disappearance of the sn cover and rapid drying of the slightly moistened soil. The meteorological conditions of the y year 1954 showed opposite characteristics. Such an interseasonal succession is a consequen of the fact that in those regions with an anticyclonic type of circulation the weather conditio of the growing season depend upon the moisture state of the underlying surface. A la excess amount of precipitation (as compared with the normal) during the growing periods wet years is a result of: the frequent occurrence of cyclones and the abundant arrival of lo water vapor into the atmosphere from the supplies of soil moisture passing from the cold the warm period. In addition to a detailed account of the weather conditions during 19 1954 and 1955 and of the characteristics of the various meteorological variables and of circulation conditions, the author presents a comprehensive summary of radiation charac istics, temperature, precipitation and wind conditions, circulation conditions, of the interact of atmospheric and relief conditions in the formation of local climate, etc. for the steppe a forest regions of Kazakhstan and the Altai Territory. Extensive data and synoptic maps presented and the weather successions in 1954 and 1955 are illustrated by means of "complex" classification of Chubukov-Fedorov. *Subject Headings:* **1. Drought conditi 2. Synoptic conditions for drought 3. Kazakh S.S.R. 4. Altai Territory, Asiatic U.S.S.R** *Author's conclusions and I.L.D.*

12.10–306 551.509.318:551.577.37:551.579.4(54

George, C. A. (*Regional Met. Centre, Calcutta*), **Synoptic study of the West Bengal flood September 1956.** (In: Symposium on Meteorological and Hydrological Aspects of Flood India, New Delhi, April 1958, **Proceedings.** Delhi, Indian Meteorological Dept., 19 p. 77–82. 3 figs., 6 refs.) **DWB** (M79.4 S989pr)—Westward moving vortices in the up troposphere above the 400-mb level were chiefly responsible for the concentrated very he rainfall that resulted in the floods over West Bengal during Sept. 1956. While a cold cycl vortex maintained the circulation and associated convergence in the lower levels, an a cyclonic cell in its rear provided the vital mechanism of divergence in the upper troposph The sub-tropical ridge-line in which these vortices are found shifts southwards and overlies monsoon trough of low pressure in the lower levels prior to the withdrawal of the southw monsoon from North India. This synoptic feature may account for the seasonal flood

arts of North India during late Sept. or early Oct. *Subject Headings:* **1. Synoptic case stories of floods 2. Seasonal floods 3. Synoptic conditions for floods 4. Bengal, India.** —*Author's abstract.*

12.10–307 551.509.318:551.586:616.988.23

Gherzi, Ernest, **Synoptic conditions of the atmospheric circulation prior to the outbreaks of poliomyelitis epidemic in the region of Montreal, Canada.** *Bulletin de Géophysique*, Montreal, No. 8:25–41, Oct. **1960.** 3 tables, 13 refs. French summary p. 25. **DWB, DLC**—The research on correlation between prolonged periods of movement (over 35 days) of the Maritime Pacific air mass and poliomyelitis epidemic is described in detail, tabulated data and graphic records. Similar correlation of the weather station data was observed by the Zikawei observatory in Shanghai, China, with outbreak of cholera. The action of the maritime air mass from the biological viewpoint is related either to more virulent "virus," which is already in existence or to decreased resistance of human body to the "virus" action. From the meteorological point of view the relation is made with proportion of oxygen, nitrogen and argon, as well as to the micron and submicron particles called aerosols. The Polar air mass contains the particles of mineral, vegetable, or mineral origin (sand, fragments of leaves, animal hair, bird feathers, etc.). The aerosols of the Maritime Pacific air mass contains mineral salts (chlorides, bromides, iodides, sulphur compounds, boracic acid, etc.). The effect of microcomposition of the maritime air mass is discussed in the text. Final analysis of data accumulated during 30 years lead to conclusion that the correlation is about 100% correct. *Subject Headings:* **1. Atmospheric circulation effects on poliomyelitis 2. Poliomyelitis epidemics 3. Montreal, Canada.**—*N.P.S.*

12.10–308 551.509.318:551.577.37/8(47)

*Glukh, I. S., **Tsirkuliatsionnye usloviia, podgotavlivaiushchie razvitie zasushlivykh i blazhnykh vegetatsionnykh periodov.** [Circulation conditions conducive to development of arid and humid growing seasons.] (In: Akademiia Nauk SSSR. Institut Geografii, **Gidrometeorologicheskiĭ rezhim lesostepnoĭ i stepnoĭ zon SSSR v zasushlivye i vlazhnye gody.** Moscow, **1960.** p. 102–111. 11 tables, 9 refs.) **DWB** (M79 A313gi)—The author investigates the dry and wet periods in the forest steppe and steppe zones of European U.S.S.R. with the aid of the classification of circulation mechanisms developed by B. L. Dzerdzeevskiĭ, V. M. Kurganskaia and Z. M. Vitvitskaia (*see U.S.S.R. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby, Trudy Nauchno-Issledovatel'skikh Uchrezhdenii, Ser. II, Sinopticheskaia Meteorologiia*, No. 21, **1946. DLC?**), a calendar of successive alternation of elementary circulation processes embracing the entire Northern Hemisphere and synoptic kinematic maps for a 55 year period corresponding to this calendar. Also an attempt is made to establish a relationship between synoptic processes producing drought in the forest steppe and steppe zone and synoptic process of the entire Northern Hemisphere. All the circulation types and subtypes (developed by Dzerdzeevskiĭ et al.) producing dry and wet periods in the forest steppe and steppe zones are classified into four groups: A—zonal circulation, B^N and B^S—meridional circulation (with disturbance of zonality of circulation processes from north and south, respectively) and C—disturbance of zonality. On the basis of frequency calculation (number of days and number of cases) the various subtypes were assigned to each of these four groups. The elementary circulation mechanisms for eight dry and eight wet years are examined. Data on the frequency of different circulation processes in the various years are given. Wet years are characterized by a more regular succession of the various processes. Arctic incursions, observed in wet years, do not establish stable regions of high pressure so that favorable conditions for the development of droughts did not arise. Dry years are characterized by the frequent disturbance of zonal atmospheric processes and the increase in the frequency of meridional processes. The frequency of meridional circulation types is greater (36%) in dry years than the frequency of zonal types (21%); in wet years the frequency of zonal circulation types is higher (51%). The origin of drought conditions in the forest steppe and steppe area is determined primarily by the fourth, third and first groups of circulation processes. The third and fourth groups are established chiefly during circulation types four and ten which are characterized by the disturbance of the zonality processes as a result of the incursion of Arctic air. The third group of processes develops when Arctic air erupts against a background of increased

pressure so that a stable area of high pressure is formed. The first group is characterized circulation types two and seven when the area investigated is under an extension of the Azo high. Arctic air and its subsequent transformation play a very important role in the formati of droughts since as a result the air masses are removed from a state of saturation, cloudiness diminished and evaporation is intensified. *Subject Headings:* **1. Synoptic conditions f drought 2. Synoptic climatology of dry and wet periods 3. European U.S.S.R.**—*I.L.D.*

12.10–309 551.509.318:551.5

House, D. C. and Lee, J. T. (*both, U. S. W. B., Kansas City, Mo.*), **A case study of extre turbulence possibilities based on considerations of buoyancy and horizontal divergen** *American Meteorological Society, Bulletin*, 42(3):175–184, March **1961.** 8 figs., 2 tables, 6 re 4 eqs. **DWB, DLC**—A study into the possibility of extreme turbulence occurring in a particu synoptic situation is discussed here. The synoptic weather data are reviewed, and the ma nitude of turbulence that might be expected is computed by two different methods. T limitations of each method are discussed. While it might be concluded that thunderstor updraft velocities were of the order of those producing extreme turbulence, the assumptio are so restrictive that it is not possible to assign confidence limits to the comput gust velocities. *Subject Headings:* **1. Synoptic conditions for turbulence 2. Atmosphe turbulence 3. Gust velocities.**—*Authors' abstract.*

12.10–310 551.509.318(51

Hsü, Ying-ching, **Applied report of the weather types in China.** *Meteorological Bulle* Taipei, Formosa, China, 1(1):1–2, March **1955.** fig., 2 folded graphs. In Chinese. **DLC** The author collected weather data from Nov. 1951 to Oct. 1954 in order to classify weath types and their variations as shown in the six tables. Using the objective method, three ye of weather data for the mainland of China were calculated statistically for each type by mon and year. Table 1 shows the frequency (number of days) of bright weather type; Table gives statistics on bright or same weather type continued, etc. Author concludes that throu objective analyses long range forecasting is possible. *Subject Headings:* **1. Weather types China 2. Long range forecasting 3. China.**—*K.C.*

12.10–311 551.509.318:551.524.32(5

Khesina, B. G., **Issledovanie sinoptiko-klimatologicheskikh sviazeĭ atmosfernykh p tsessov i anomalii temperatury sentiabria.** [Study of the synoptic-climatological relationsh between atmospheric processes and temperature anomalies in September.] *Moscow. Ts tral'nyĭ Institut Prognozov, Trudy*, No. 92:89–112, **1960.** 6 figs., 15 tables. **DWB**—Th groups of circulation processes with varying frequency occur in September over the Europe U.S.S.R. and Western Siberia. The first group contains latitudinal processes (types 1 and the second group contains blocking processes (types 3 and 4) and the third group conta meridional processes (types 5, 6, 7). With increase in solar activity the frequency of meridio and blocking processes increases and with reduction in solar activity the frequency of latitudi processes (type 1) and also of stationary anticyclones over the British Isles increases (type 7 The maximum number of warm processes and hence also, warm Septembers occurred in ye with increased solar activity. September is warm (cold) when the number of days w predominant synoptic processes producing a definite temperature anomaly is in this mo greater than normal (normal for warm Septembers in the European 16.8 days, in West Siberia 18.6 days, for cold September 13.2 and 11.4 days respectively). The mean mont temperature anomaly of any type is produced usually by the combination of 2–3 types processes with any one predominating. September is characterized by five types of tempe ture anomalies, namely: Type 1—warm over the entire territory in 42.6% of the cases; proces of the first type predominate in combination with 3, 7a and 3C. Type 2—warm over European USSR and cold over Western Siberia in 14.7% of the cases; processes of the f type are combined with types 6 and 7. Type 3—cold on the entire area examined in 16.2% the cases; processes of the fifth type and their combination with 6 and 7 are most freque Type 4—cold over the European USSR and warm over Western Siberia in 20.6% of all cas a combination of 5.7 and 1 is formed. Type 5—normal over the entire territory in 5.9% the cases; processes of the first type predominate in combinations with types 3a, 4a and

orecasts of the development of synoptic processes and temperature anomalies are based upon ne relationship (taking into account solar activity) between the succession of synoptic processes nd mean monthly temperature anomaly of September with all preceding eleven months. he sequential development of synoptic processes of September is most closely related to the ecember processes of the preceding year. The best relationships in the distribution of eptember temperature anomalies with preceding months are presented. *Subject Headings:* **Synoptic conditions for temperature anomalies 2. Atmospheric circulation processes European U.S.S.R. 4. Western Siberia.**—*I.L.D. and Author's conclusion.*

12.10–312 551.509.318:551.553.8:551.515.8(522)

Kinoshita, M., **A synoptic study on the gustwindstorm in the East China Sea and the orthern Kyushu District on January 21, 1958.** *Journal of Meteorological Research*, Tokyo, 1(2):89–96, Feb. **1959.** 12 figs. In Japanese; English summary p. 89. **DWB.** Reprinted s *Oceanography and Meteorology*, Nagasaki, Japan, 9(177), **1959.**—In this paper, the author vestigated a remarkable gustwindstorm in the northern Kyushu District and the East China ea on January 21, 1958. The meso-analysis was carried out mainly using maritime meteoro-gical data reported from many vessels in the East China Sea. The remarkable warm type stwindstorm appeared as a result of the formation of instability line before the passage of old front, while the cold type gustwindstorm appeared after the passage of cold front and was ot so strong. The shear line is considered to play an important role as factor for the formation instability line. *Subject Headings:* **1. Synoptic conditions for gusts 2. Wind storm studies China Sea 4. Kyushu District, Japan.**—*Author's abstract.*

12.10–313 551.509.318 551.509.335

§Knox, J. L. (*Dept. of Transport, Canada*), **A remarkable analogue.** *Weather*, London, 5(3):77–82, March **1960.** 6 figs., 3 refs. **DWB**—This report describes a remarkable analog the Weather Office of Malton Airport near Toronto, Canada. The date of the analog was larch 13, 1959, when the situation was very similar to that of March 9, 1956. The Malton ffice based its week-end forecast (for March 14 and 15, 1959) on what had happened on larch 10 and 11, 1956. The forecast was very accurate. The author lists several reasons hy the analog technique is in disfavor. He concludes with the suggestion that the analog ethod be used to complement the synoptic and numerical methods of forecasting. *Subject eadings:* **1. Analog forecasts 2. Malton Airport, Toronto, Canada.**—*M.L.R.*

12.10–314 551.509.318:551.577.3(47)

*§Kuvshinova, K. V., **Tipy atmosfernykh protsessov i sviazannye s nimi osadki, vypadaiu-chie v vegetatsionnye periody zasushlivykh i vlazhnykh let.** [Types of atmospheric proc-sses and corresponding precipitation occurring during the growing seasons of arid and humid ears.] (In: Akademiia Nauk SSSR. Institut Geografii, **Gidroklimaticheskiĭ rezhim leso-tepnoĭ i stepnoĭ zon SSSR v zasushlivye i vlazhnye gody.** Moscow, **1960.** p. 112–128. figs., 4 tables, 9 refs.) **DWB** (M79 A313gi)—The annual and geographical distribution of recipitation in the forest steppe and steppe zones of European U.S.S.R., the effect of relief pon the distribution of precipitation and the effect of water vapor transported over the forest eppe and steppe regions upon precipitation are discussed on the basis of various studies vailable in the literature. In this paper the author attempts to determine the probability of arious amounts of precipitation over the forest steppe and steppe zone of European U.S.S.R. s a function of circulation type. A 10-year period including both dry and wet years (1936, 938, 1945–1952) was selected and the synoptic situations for April-July over the territory xtending from 30 to 60°N lat. and 45 to 55°E long. were examined. Analysis of the circulation rocesses over this area and a consideration of the differences in amounts of precipitation sulted in the establishment of eight types of synoptic processes, namely: Cyclonic types: —cyclone arising over the forest steppe and steppe zone; Ia—cyclone arriving from the south-est or from the south; Ib—cyclone erupting from the west; Ic—cyclone arriving from the orth-west; II—cyclone arriving from the southeast or east; III—trough over the entire area over a large part; Anticyclonic types: IV—westerly incursion; V—northwesterly or westerly ncursion; VI—anticyclone or its periphery; VIIa—a deepened pressure field (anticyclonic); IIb—deepened pressure field (cyclonic) and VIII—passage of meridional fronts. In dry

years anticyclonic circulation types prevail. During months with precipitation amoun significantly below the normal the number of days with anticyclonic circulation usually exceed 18 (circulation Type VI prevails over most days) but the number of days with cyclone passag (Types I and II) is less than 7–8. In months with high moisture the number of days wit Types I and II reaches 12–15 but with anticyclones it is less than 15. Even during lon droughts there may be individual periods with considerable precipitation. During cyclon circulation (Types I, II and III) the mean amount of precipitation was 4.6 mm but durin anticyclonic circulation (Types V, VI and VIII) it was 1.9 mm. The greatest mean amou of precipitation (7.0 mm) in the forest steppe and steppe occurred during the passage of westerly cyclone. In the case of Type Ia the mean precipitation was 4.9 mm. The smalle precipitation amount occurred during cyclonic Type II. Even during extended droughts th passage of a cyclone of any type (except Type II) resulted in intense precipitation and in w years slight amounts of precipitation may be associated with any cyclone type. Durin periods of large amounts of precipitation there was a frequent alternation of circulation typ but in dry periods there was a temporal stability of types. Data on the frequency of types synoptic processes and of the mean amount of precipitation from their mean values (% maps of synoptic situations and associated precipitation amounts, etc. are presented. *Subje Headings:* **1. Precipitation probabilities 2. Circulation type frequencies 3. Synoptic process over European U.S.S.R. 4. European U.S.S.R.**—*I.L.D.*

12.10–315 551.509.318:551.526.6:551.326

Kuznetsov, O. A., **O roli aleutskogo minimuma v formirovanii ledovitosti Chukotsko moria.** [The role of the Aleutian low in the formation of ice conditions in the Chuckchee Sea *Problemy Severa*, Moscow, 3:10–15, **1959.** 3 figs., 6 refs. **DLC**—Influence of temperature the Atlantic waters on the freezing of Arctic seas, described in various works since Nansen (1909), are briefly reviewed. Two effects of heat transmission are considered: 1. direct—t transmission of the heat by sea currents and 2. indirect—the influence of the water temperatu on the atmosphere and its circulation. Freezing of the Barents Sea is attributed to the te perature of the water itself. But sometimes the temperature of the Atlantic waters redu freezing in the Greenland and Barents Sea, because at the same time the warmed air (cyclon above the water passes over the Northern Route. Similarly the temperature conditions of t water in the North Pacific have direct and indirect influences on the ice conditions in the Arc basin and Chuckchee Sea. Variations in air pressure distribution are discussed in the text wi 3 Arctic region maps (with isolines) for Dec. 1949, Jan. and Feb. 1950, and trajectories cyclone movements are shown on 8 maps of the eastern section of the Arctic region for O 1931 to July 1932. The character of atmospheric pressure above the northern part of t Pacific Ocean, including the Aleutian low in winter has an important role in the freezing of t Chuckchee Sea. Position of the Aleutian low can be used for long range forecasting of freezi in the Chuckchee Sea as well as in the eastern part of the eastern Siberian seas. *Subject Hea ings:* **1. Synoptic conditions for sea ice formation 2. Sea ice forecasting 3. Aleutian l 4. Chuckchee Sea.**—*N.P.S.*

12.10–316 551.509.3

Lecce, Biagio and Del Trono, Fulvio, **"Flusso medio" della circolazione atmosferica en periodi statisticamente determinati e suo comportamento annuale.** [Average flux of t atmospheric circulation between the statistically determined period and its annual behavio *Geofisica e Meteorologia*, Genoa, 8(3/4):53–56, **1960.** 2 figs., 3 tables, ref. Italian and Engl summaries p. 56. **DLC**—With reference to the possibility of defining statistical weather ty on the basis of the (average atmospheric flux) changes, the influence that (permanent ba field) variations exert from year to year on the above weather types is shown here. *Subj Headings:* **1. Atmospheric circulation 2. Weather types 3. Baric fields.**—*Authors' abstrac*

12.10–317 551.509.318:551.524.32(5–0

*Leskova, E. A., **Ekstremal'no teplye i ekstremal'no kholodnye sinopticheskie sezony zi v Vostochnoĭ Azii.** [Extremely warm and extremely cold synoptic seasons in winter in East Asia.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Tru* No. 10:3–37, **1960.** 10 figs., 8 tables, 11 refs. Russian summary p. 36. **DWB**—An atten

made to determine the characteristics of East Asia and to establish forecasting indicators in the synoptic processes of the two preceding seasons. Synoptic maps for the period 1933–1957, maps of pressure topography from 1947 to 1959, and mean monthly temperature anomalies from 1933 to 1957, etc., were used. Synoptic conditions of formation of four groups of winters with extreme temperatures were established. Group I contains extremely warm winters with positive anomalies over a large part of the area being studied. Group II contains cold winters with a predominance of negative anomalies; Group III is characterized by winters with negative temperature anomalies in the form of latitudinal zones directed over the continent from the Sea of Okhotsk—in some years these zones are bounded by positive anomalies from north to south; and Group IV includes winters with positive anomalies over the Sea of Okhotsk and eastern Yakutia and negativeness over the remaining area. In each group the seasonal temperature anomaly is determined by high altitude flow which produces definite anticyclonic and cyclonic trajectories. Each group is determined by a series of characteristics, namely: specific synoptic processes, number of cold and heat waves, mean monthly temperature anomaly, intensity of the Asiatic maximum, etc. Before each of these groups of winters there were observed typical synoptic processes, which were repeated in 52% of the days in the natural synoptic seasons of fall and pre-winter, and also in their middle months of September and November. During the fall and pre-winter preceding non-extreme winters, the typical synoptic processes (characteristic of extreme winters) were encountered in 16–38% of the days of the season and in 17–33% of the days of September and November. There was established a series of supplementary indicators of extreme winters which included particular relationship between groups of winters and a definite frequency of cyclonic trajectories in the preceding summer-fall months for particular regions of East Asia. These relationships are as follows: (1) between the circulation index over the Sea of Okhotsk in August and the temperature anomaly in this region and East Yakutia in the preceding winter; (2) between the circulation index over the north of East Asia in November and the winter temperature anomaly over East Asia; (3) between the circulation index of the summer seasons over the Far East and the winter temperature anomaly over East Asia. *Subject Headings:* **1. Synoptic climatology of winter weather 2. Severe winters 3. Warm winters 4. East Asia.**—*Transl. of author's summary & I.L.D.*

12.10–318 551.509.318:551.575.1(477)

L'vova, N. S., **Obrazovanie tumanov v raĭone Kirovograda.** [Fog formation in the Kirovograd region.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:58–62, **1959.** 7 tables, **DWB, DLC**—212 cases of fog formation that took place between 1951 and 1955 (or 42 cases per year) were studied by the author and the results are tabulated. It is shown that fogs occur predominantly in the cold period, at night or in the early morning during the blowing of SE or E winds. The forecasts of the formation or dissipation of fogs depend on the correct prediction of air temperature and humidity. Advection fogs occur mainly (85%) at 200 m cloud height. *Subject Headings:* **1. Forecasting fog formation Kirovograd, Ukrainian S.S.R.**—*A.M.P.*

12.10–319 551.509.5

Maede, Hans., **Regeln über die Umschläge von Grosswetterlagen bzw. Grosswettertypen.** [Rules of large scale weather situations or large scale weather types.] *Zeitschrift für Meteorologie*, Berlin, 14(4):100–102, April **1960.** 3 refs. **DWB, DLC**—The causes underlying the reversal of large scale weather situations or large scale weather types of Europe were investigated by setting up a group of reversal rules involving the use of such values as the zonal components, meridional components, height of the 500 mb surface over the west and east Atlantic, Central, East and North Europe, one and three day tendencies of these areas, etc. A total of 52 parameters describing the daily circulation was obtained. The definition of a weather reversal, the conditions for a reversal and the predictive characters of the rules are discussed and the actual procedure in setting up a reversal rule is illustrated. The results of the application of the rules showed that out of 139 forecasts 74(53.3%) were successful; in 48(34.5%) the predicted type occurred but the cyclonicity or anticyclonicity was not predicted, and in 17(12.2%) no predictions were verified. *Subject Headings:* **1. Large scale weather situations 2. Forecast verification.**—*I.L.D.*

12.10–320 551.509.318:551.524.37(5

Masumura, K., **On the late frost at Owase.** *Japan. Meteorological Agency, Memoi of Industrial Meteorology*, 21(2):83–87, **1958.** fig., 6 tables. In Japanese; English summa p. 86–87. **DWB**—The author investigated the condition of the formation of late frost quan tatively for the purpose of forecasting in the southern part of Mie Prefecture from 17 years data obtained by the Owase Weather Station for various decades from the first decade of Ap to the first decade of May, 1939–1956 (Tab. 1). Working out the correlation between t minimum air temperature of Owase and the temperature in the upper layer (700 mb) ov Wajima during a frosty night, the author classifies the decrease in temperature into thr types a, b, and c, and observes different characteristics of the minimum air temperature, temperature at 18h of the previous day and wind velocity at the time when frost forms accordi to these different types (Fig. 1 and Table 6). Results are summarized as follows: the distrib tion of minimum air temperature and minimum grass temperature shows their peak at 0° −2°C and −1° to −5°C, respectively and distribution of difference between the two shows peak at 5°to −5°C; 80% of frost occurred when the wind direction was northwesterly and t velocity was 1–2 m/s, 73% occurred during clear weather. The method for deducing t minimum air temperature involved use of Brunt's formula. *Subject Headings:* **1. Large sca weather types 2. Late frosts 3. Mie Prefecture, Japan.**—*K.C. and author's abstract.*

12.10–321 551.509.318:551.578.4(57

*§Mishnina, G. A., **Potepleniia i snegopady v zimiĭ period na territorii Iakutskoĭ ASSR vostochnom protsesse.** [Warming and snowfall in the Yakutsk A.S.S.R. during the "easte process" in winter.] *Dal'nevostochnyĭ Naucho-Issledovatel'skiĭ Gidrometeorologicheskiĭ Instit Trudy*, No. 11:85–99, **1960.** 8 figs., 7 tables, 4 refs. Russian summary p. 99. **DWB**—T paper is an examination of the synoptic conditions leading to the origin of the "eastern proce and the possibility of forecasting it. The eastern process is defined as the transport of a wa air mass from the regions of the Okhotsk Sea to the northwest over Yakutia; o such processes in which the warming up at the earth exceeded at least 5°C are examined. T investigation is based upon 42 cases of "eastern processes" during the period 1952–19 The characteristics of the meteorological variables accompanying the development and ma tenance of "eastern processes," synoptic characteristics of "eastern processes" including traj tories of air particles and types of eastern processes and the aerological characteristics "eastern processes" are discussed with the aid of numerical data and synoptic maps. T following features enable eastern processes to be forecast 24 hours in advance: (1) the char teristics depth and horizontal dimensions of the steering cyclone (depth less than 1000 m a diameter of 2000–4000 km); (2) the characteristics of the pressure tendency at the ear surface (fall); (3) the characteristics of pressure fields aloft; (4) transition of wind at the 300 height to the southeast quarter with a velocity of at least 40 km/hour; the pressure and therm gradients at AT_{500} and OT_{100}^{500} maps; (5) before the start of the "eastern process" they sho be at least 10 dkm in 1000 km; and (6) presence of heat advection. The simultaneous ris all these features enables the start of an eastern process to be forecast 24 hours in advance w an accuracy of 85–88%. *Subject Headings:* **1. "Eastern" regime in Yakutsk A.S.S.R. 2. S optic aerological studies 3. 24-hour forecasts 4. Yakutsk A.S.S.R.**—*Transl. of auth abstract and I.L.D.*

12.10–322 551.509.318:551.577.3(4

Mishutin, D. A., **Rezhim osadkov osnovnykh sinopticheskikh ob"ektov.** [Precipitat regime in the main synoptic processes.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Lening Izvestiia*, 92(6):521–524, Nov./Dec. **1960.** 5 tables. **DWB, DLC**—The amount of precip tion falling in connection with different synoptic structures, which produce the precipitat was investigated for Dnepropetrovsk Region of the Ukrainian S.S.R. which is character by a comparatively uniform underlying surface and relief—the differences in elevation in area do not exceed 144 m. Data are presented on the seasonal variation of the 24-hour amo of precipitation resulting from the passage of cyclones, troughs, ridges and various undetermi structures averaged for the period 1936–1940; the distribution of seasonal totals of precipita for the different pressure structures averaged (%) for 1936–1940; the number of atmosph fronts accompanying precipitation averaged (in %) in relation to all fronts for 1936–1

easonal variation of atmospheric precipitation produced by the passage of different atmospheric fronts, namely: warm, cold, occlusion and secondary fronts averaged for 1936–1940, nd the distribution of atmospheric precipitation according to different atmospheric fronts roducing the precipitation (averaged for the period 1936–1940). *Subject Headings:* **1. Preipitation regime 2. Synoptic processes in Ukraine 3. Dnepropetrovsk, Ukrainian S.S.R.** *.L.D.*

12.10–323 551.509.318:551.577.38(73)

Namias, Jerome (*U. S. W. B.*), **Factors in the initiation, perpetuation and termination of drought.** [U. S. Weather Bureau, **1960?**] 15 p. 4 tables, 10 figs., 12 refs. **DWB.** Also in: *International Union of Geodesy and Geophysics. Association of Scientific Hydrology, Publication*, No. 51:81–94, **1960.** 10 figs., 4 tables, 12 refs. English and French summaries p. 81. **DWB** (M(06) I611g)—Summer drought in temperate latitudes is generally associated with great mid-tropospheric anticyclones and accompanying positive departures from normal in pressure. These anticyclones are asymmetrical with respect to moisture, being composed of nward, spiralling moist and dry tongues, the latter having their source at upper levels of northward displaced prevailing westerlies and then subsiding into the core of the high pressure ell. Such dislocations or anomalies in the westerlies almost always occur in groups so that a number of drought areas develop simultaneously. Antecedent conditions favoring summer drought appear to show up in forms of the springtime general circulation over the Northern Hemisphere and many times in the prevailing spring weather over the area to be affected. The precursory signs come to light in fields of lag correlation between spring and summer mid-tropospheric height patterns and also in studies of contingency tables relating temp. and precip. in spring to the following summer condition. The results strongly suggest that prevailing circulations which cause warm, dry weather in spring over the Great Plains of the U. S. tend to lead to drought in summer. Similar, though not as strong, indications show up from one summer to the following. *Subject Headings:* **1. Drought forecasting 2. Summer drought 3. Great Plains, U. S. 4. Circulation effects on drought.**—*E.Z.S.*

12.10–324 551.509.318:551.578.43(74)

Namias, Jerome (*U. S. W. B.*), **Factors leading to variations in monthly and seasonal snowfall over Eastern United States.** [**1960?**] 11 p. 11 figs., table, ref. Photostat of typescript. **DWB.** Also in: *Eastern Snow Conference, Proceedings*, Vol. 6, **1961.** p. 167–184. figs., table. **DWB** (M(06) E13P)—Variations in annual snowfall over Northeastern U. S. are associated and probably dependent upon the average patterns of the general atmospheric circulation in the vicinity of North America and adjacent portions of the neighboring oceans. These patterns influence the life history of storms, in part by injecting air masses of differing properties in differing locations from year to year. Large-scale variations in wind-pattern give greater meaning to simple analyses of averages of elements associated with varying seasonal snowfalls at one station. Large variations of snowfall, over decades as well as between years, appear to be highly correlated with the average mid-tropospheric prevailing wind pictures. A special analysis of conditions during the 1940's and 1950's reveals a large area of increased snowfall from the eastern Great Lakes to the Appalachians and a general decrease to the east. These differences are associated with large-scale differences in the mean upper wind circulation between decades favoring increased maritimity and warmth in the 1950's but operating in such a manner as to increase snowfall well inland while decreasing it along the Atlantic coast. Average snow recorded at 32 stations over Northeastern U. S. for 1929–1959 are tabulated, and 10 other figures illustrate the points discussed. *Subject Headings:* **1. Synoptic conditions for snowfall 2. Snowfall variations 3. Eastern U. S.**—*E.Z.S.*

12.10–325 551.509.318:551.525.2:631.4

Runge, H. (*Hauptwetterdienststelle Potsdam*), **Bodenfrost auch im Hochsommermonat Juli.** [Ground frost in July.] *Zeitschrift für Meteorologie*, Berlin, 13(1/6):134, Jan./June **1959.** 2 figs. **DWB, DLC**—The first ground frost observed in July since the beginning of meteorological observations in the area of the DDR was verified in the region of Luchenwalde and of the Vogtland on July 26, 1958. Two meteorological charts illustrate the weather conditions of July 25 and 26. *Subject Headings:* **1. Ground frost 2. East Germany.**—*O.T.*

12.10–326 551.509.318:551.515.8(584.6

§Shchukina, N. F. and Kuvaldina, E. D., **Sinopticheskie usloviia severnykh vtorzhenii n Iugo-vostochnye raĭony Kazakhstana.** [Synoptic conditions leading to northerly outbreak into the southeastern regions of Kazakhstan.] *Alma-Ata, Kazakhstan. Nauchno-Issledo vatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 6:83–100, **1956.** 8 figs., 6 tables. **DW** —This article is directed to the consideration of cold northern intrusions into southeastern regions of Kazakhstan. Definition of northern intrusion is given. As a base for determinatio of intrusion, the trajectories of anticyclone motion are analyzed and supplemented by th penetration of cold masses of air from the north and northeast along the periphery of th stationary anticyclone. The difficulties of forecasting precipitation are mentioned. Shor review of previous work on the subject is given. The types of synoptic situation of cold intru sion are discussed with detailed analyses of each type. The quantities of precipitation observe are discussed. A great number of derived conclusions (14) are given. The article is we illustrated with synoptic maps and tables. *Subject Headings:* **1. Synoptic conditions for col air invasions 2. Cold air invasions 3. Kazakh S.S.R.**—*B.J.G.*

12.10–327 551.509.318:551.577.51(234.42

Szepesi, Dezso, **Die orographische niederschlagsbildende Wirkung der Gebirge de Karpatenbeckens.** [Orographic precipitation effects of the mountains of the Carpathia basin.] *Időjárás*, Budapest, 64(3):144–152, May/June **1960.** 13 figs., 5 refs. Englis summary p. 144. **DLC**—The author analyzes 43 synoptic situations in which a precipitatio increasing effect of the Carpathian mountains can be found. It can be stated that the region distribution of the orographic precipitation-intensity (mm/hour) is in close connection wit the average ascent of the mountain. An orographic precipitation surplus can be found eve on the windward side, but on the lee-side it shows a strong decrease. The maximum intensit of the orographic precipitation coincides with the peak of mountain. The regions of negativ orographic precipitation are explained with foehn-like downward currents having a precipitatio decreasing effect. *Subject Headings:* **1. Orographic effects on precipitation 2. Synopt analysis of orographic precipitation 3. Carpathian Basin.**—*Author's abstract.*

12.10–328 551.509.3

Hsü, Ying-ching, **Introduction to the method for chart forecasting.** *Meteorologica Bulletin*, Taipei, Formosa, 1(1):36–38, March **1955.** 2 figs., 12 eqs. In Chinese. **DLC** Describes the graphical weather forecast introduced by FJØRTOFT with respect to fundament theory for graphical integration of relative and absolute vorticity equations and preparatio of prognostic charts. *Subject Heading:* **1. Fjørtoft's graphical method.**—*K.C.*

12.10–329 551.509.318:551.515.13(9

Tauber, G. M., **Sinopticheskie usloviia indiĭskogo sektora Antarktiki.** [Synoptic cond tions of the Indian sector of the Antarctic.] *Sovetskaia Antarkticheskaia Ekspeditsiia, 195* [*Materialy*], Vol. 2, issued Leningrad, **1959.** p. 46–48. **DWB** (M82/99 K81pe), **DLC**—T southern part of the Indian Ocean is the region of intensive cyclonic activity. The formatio of cyclones was observed on different fronts: the polar frontal cyclones originated on th Atlantic and Indian branches of the polar front, and the cyclones on the Antarctic front. T method and movements of these fronts and cyclones are described with detail on the basis observations of the Antarctic meteorological stations and analysis of the synoptic map Above the Antarctic it was observed that anticyclonic circulation originated as the result heavy cooling of air above the ice field in central Antarctica. Deep cyclones, shifting along th Pravda sea shores, or becoming stationary in this region, affect the weather along the shore li and in the belt 100 mi from the sea. This often causes storm activity around the statio Mirny and Pioneerskaia. Distribution of the precipitation along the Pravda coast is great affected by the slope of the ice plateau, which forces the moist sea air to rise above the Antarct continent. The zone of large precipitation is located from 3 to 50 km from the shore. T steep shore of the ice plateau near Mirny strongly affects the weather, redirects the wind a disturbs the normal relation between variation and temperature. This complicates t synoptic analysis and weather forecast in the Mirny region. *Subject Headings:* **1. Antarct circulation 2. Synoptic conditions for storms 3. Antarctica.**—*N.P.S.*

12.10–330 551.509.318:551.578.7(712.3)

†Thompson, C. E. and Smith, D. H., **Synoptic study of the 1958 hail season in central Alberta.** *Canada, Meteorological Branch, CIR*-3308; TEC-317, Feb. 24, 1960. 51 p. 25 figs., 1 tables, 16 refs. **DWB, DLC**—The major hail activity of 1958 is tabulated. 1958 was considered a fairly light hail year, but even so 37 days were designated as hail days. The more destructive storms of the strip type have been examined, with special attention to the worst of the season on July 22. Examinations of the main synoptic features at the surface and in the upper air for every day indicated a few significant differences between hail days and non-hail days. The Bailey convective graph and vorticity and height-change charts show promise as objective aids to the difficult forecast problem. The jet stream plays a role in hail situations. Major hailstorms in Saskatchewan were produced by factors similar to those in Alberta. Hailstorms in Saskatchewan frequently follow the day after an outbreak in Alberta. *Subject Headings:* **1. Synoptic conditions for hail 2. Hail forecasting 3. Jet stream influences 4. Alberta, Canada.**—*Authors' abstract.*

12.10–331 551.509.318:551.511(26) 551.509.311:551.515.13

*Trostnikov, M. V., **Sinopticheskie usloviia vynosa mass morskogo vozdukha zimoĭ na Dal'nego Vostoka.** [Synoptic conditions for the transport of sea air to the southern Far East during winter.] *Dal'nevostochnyĭ Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 11:54–84, 1960. 22 figs., 6 tables, 8 refs. Russian summary p. 84. **DWB**—The displacement of warmer and moister air from the eastern seas and adjacent northwestern regions of the Pacific Ocean to the continent during winter is anomalous for the winter season; in relation to the moderate latitudes of East Asia this displacement is termed an "eastern process." This displacement of marine air over Priamur and the Primor'e Territory is a result of anticyclonic and cyclonic processes. The principal characteristic of the anticyclonic type of displacement is the appearance over the Chukotka region of a warm anticyclone aloft moving in a westerly direction with subsequent anticyclonic latitudinal transformation of high altitude flow over Yakutia and adjacent regions. The fundamental characteristic of the cyclonic type of displacement is the appearance of a cyclone from the south over the Kurile Islands and its intense deepening. The displacements are observed every winter, but in individual seasons they are observed several times. Over a period of 24 winters (1935–1959) there were observed 40 cases accompanied by snowfall in Priamur. Anticyclonic types of displacements were observed somewhat more infrequently than cyclonic types; the mean duration of anticyclonic displacements was 3–5 days—of the cyclonic ones no more than 1–3 days. During anticyclonic displacement warm air masses in the lower kilometer layer extend over Primor'e over the surface of the Pacific Ocean adjacent to Kamchatka. The orographic features of the southern regions of the Far East exert considerable influence on the distribution of meteorological elements during winter displacement, especially on the distribution of precipitation. With the aid of extensive data and synoptic maps the author discusses the circulation conditions of the cyclonic and anticyclonic type, the frontal conditions associated with atmospheric transport and the forecasting characteristics of winter displacement. *Subject Headings:* **1. Synoptic conditions for air mass transport 2. Air mass transport 3. Winter circulation regimes 4. Maritime Territory, Asiatic U.S.S.R.**—*Transl. of author's abstract and L.D.*

SHORT RANGE FORECASTING OF SPECIFIC ELEMENTS (551.509.32)

Wind (551.509.322)

12.10–332 551.509.322:551.553.8:551.515(265)

Kinoshita, M., **Notes on the forecasting of gustwindstorms in the East China Sea and off Kyūshū in winter (General Report on gustwindstorms, Pt. 1).** *Journal of Meteorological Research*, Tokyo, 12(8):518–523, Aug. 1960. 11 figs., table. In Japanese; English summary p. 518. **DWB, DLC**—25 cases of gustwindstorms in the East China Sea and off Kyushu observed during the gustwindstorm project (winter in 1955 and 1957 to 1959) have been analyzed. Some empirical suggestions useful for establishing a proper forecasting method have been described. *Subject Headings:* **1. Gust forecasting 2. China Sea.**—*Author's abstract.*

12.10–333 551.509.322:551.553.8:551.555.9(521.61

Nakayama, A., **On the local strong wind in the southern part of Izu Peninsula.** *Journa of Meteorological Research*, Tokyo, 12(4):199–208, April **1960.** 11 figs., 12 tables, 3 refs., 3 eq In Japanese; English summary p. 199. **DWB, DLC**—Near the southern part of Izu Peninsul a local strong wind frequently prevails in the migratory anticyclone with a very weak pressur gradient in the macroscale synoptic chart. It was investigated for 52 cases in 1954 to 195 statistically, and analytically with the meso-scale synoptic chart. As the result, it was foun that the increase of pressure gradient in the east of the peninsula owing to the convergence o advection current from the migratory anticyclone intensified at night in the plains of Kanto an the development of sea breeze in the Suruga Bay caused the local strong easterly wind. Class fying the pressure pattern in the meso-scale synoptic chart into 3 types, H_n type (Fig. 3 S type (Fig. 4) and X type, it was found that the wind speed at Nagatsuro increased discon tinuously in the case of H_n type, while linearly in S type. *Subject Headings:* **1. Local wind 2. Izu Peninsula, Japan.**—*Author's abstract.*

Temperature (551.509.323)

See also: **Factors affecting sea surface temp.** (Laevastu), 12.10–25.

12.10–334 551.509.32

Endō, H., **On the examination of M. E. Berliand's method for minimum temperatur prediction.** *Journal of Meteorological Research*, Tokyo, 12(12):868–875, Dec. **1960.** 6 figs 5 tables, 3 refs., 9 eqs. In Japanese; English summary p. 868. **DWB, DLC**—M. E Berliand's method for minimum temperature prediction was examined on the data at 2 stations in central Japan. Although the estimations of wind speed, soil temperature an thermal conductivity of ground were rather crude and the effect due to thermal advection wa not taken into consideration, the mean errors were small and confined between 1°C and 2°C a every station because of taking into consideration the local correction factors closely relating t the continentality of the location. Examining the errors of prediction with respect to the win speed and the existence of antecedent rain, it was found that they increase with wind spee while they do not depend appreciably on the existence of antecedent rain. In consequenc it was suggested that the effect of wind on cooling of air near the ground is necessary to estima more exactly. *Subject Headings:* **1. Minimum temperature forecasting 2. Berliand's metho** —*Author's abstract.*

Cloud, Precipitation, Rime and Glazed Frost (551.509.324)

See also: **Dynamical prediction of large-scale condensation** (Smagorinsky), 12.10–281; **Forecasting heavy snowstorms associated with major cyclones** (Bailey), 12.10–284; **Linear predictability of weather radar signals** (Noel, Fleisher), 12.10–392.

12.10–335 551.509.324.2:551.578

Bibilashvili, N. Sh.; Lapcheva, V. F.; Ordzhonikidze, A. A. et al., **Osobennosti koagulia sionnogo rosta gradin, sviazannye s izmeneniem skorosti vertikal'nykh potokov po vysot** [Characteristics of the coagulation growth of hailstones associated with changes in the spee of vertical currents with height.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 4:58 593, April **1960.** 5 figs., 3 tables, 3 refs., 11 eqs. **DLC.** Transl. into English in the correspon ing number of its *Bulletin of the Academy of Sciences, USSR, Geophysics Series.* **DLC**—T authors attempt to calculate the coagulation growth of cloud particles which is fundamenta in the formation of shower rain and hail. These calculations were carried out by taking in account the developmental characteristics of cumulus and cumulonimbus clouds observed 1955–1957 during the Alazan and Elbrus expeditions. A method for forecasting hail process is proposed on the basis of these calculations. The growth of velocities of ascending curren with height, size distribution of drops and duration of shower rainfall and hail in cumulus an cumulonimbus clouds are discussed. Equations are developed for calculating approximate the growth of cloud drops in cumulonimbus and stratocumulus clouds. For forecasting ha conditions the temperature stratification, height and thickness of the clouds and velociti

of ascending currents are calculated from atmospheric radiosonde data. The dimensions of hail during fall to the height of the zero isotherm are determined by the equations

$$z=2z_p+\frac{b}{a}-\frac{\gamma}{a}\sqrt{R}+\frac{\gamma^2}{2Aa^2}+\left[\frac{\gamma}{a}\sqrt{R_0}-\frac{\gamma^2}{2Aa^2}-\frac{b}{a}-Z_p\right]\exp\frac{2Aa}{\gamma}(\sqrt{R}-\sqrt{R_0})$$

and

$$Z=Z_m+\frac{b}{a}-\frac{\gamma^2}{2Aa^2}\left(\frac{2Aa}{\gamma}\sqrt{R}+1\right)+\left[\frac{\gamma^2}{2Aa^2}\left(\frac{2Aa}{\gamma}(\sqrt{R_{z_1}})+1\right)-\frac{b}{a}\right]\exp\left[\frac{2Aa}{\gamma}(\sqrt{R}-\sqrt{R_{z_1}})\right].$$

The prevention of hail by influencing cumulonimbus clouds is discussed. *Subject Headings:* **1. Hail forecasting 2. Hailstone growth 3. Vertical current effects on hail formation.**—*I.L.D.*

12.10–336 551.509.324.1:551.576.1:551.515.4

Doberitz, Rolf, **Zur prognostischen Bedeutung von Altocumulus castellatus und floccus.** [Prognostic significance of altocumulus castellatus and floccus.] *Zeitschrift für Meteorologie*, Berlin, 12(7):204–205, **1958.** 3 refs. **DLC**—The author investigated the relationship between altocumulus castellatus and floccus and subsequent shower or thunderstorm rainfall by taking all days at Warnemünde during the months May–Aug. in the period 1948–1958 in which altocumulus castellatus was observed. From the 207 days obtained, the author excluded all days—50 days—on which more than $\frac{3}{10}$ Cu cmg or Cb occurred. Among the remaining 157 days, 74 days or 47%, were followed by local showers, or thunderstorms, within 24 hrs. The criterion for heat thunderstorm is an area of about 500 km radius around Warnemünde free from surface front or fronts aloft. A similar procedure was used to study the value of altocumulus floccus as a thunderstorm prognosticator. Out of 300 cases of altocumulus castellatus and altocumulus floccus, respectively, 152 or 51% were followed by showers, local and thunderstorm rainfall within 24 hrs. In the case of high pressure weather situations 10 out of 38 cases followed this rule (−36%). Also these values lay within the random range. Hence, this rule was not confirmed. Analysis of the path followed by the frontal shower, local and distant thunderstorms succeeding altocumulus castellatus and altocumulus floccus within 24 hrs provided the reason for the fundamental collective probability of about 0.50. This rule cannot be applied to the Mecklenburg coast and probably not to the northwestern coastal region. *Subject Headings:* **1. Thunderstorm rainfall forecasting 2. Cloud types.**—*I.L.D.*

Precipitation (551.509.324.2)

12.10–337 551.509.324.2

Gilman, Charles S.; Peterson, K. R.; Cochrane, G. M. et al., **On quantitative precipitation forecasting.** *U. S. Weather Bureau, National Hurricane Research Project Report* No. 38, Aug. **1960.** 143 p. figs., tables, refs., eqs. **DWB** (M15.2 U5845r)—A basis for quantitative precip. forecasting is developed which when combined with synoptic experience, particularly in regard to sea level prognostic charts, enables the preparation of 6- and 24-hour precip. forecasts. Surface isobaric configurations and dynamic trajectories are used to locate regions of convergence and precip. The concept of volumetric control is used to determine specific precip. amounts. In Pt. 1, through theoretical and empirical considerations, it is shown that (1) conditions where cyclonic shear and/or curvature of the geostrophic wind is greater than anticyclonic shear and/or curvature of the real wind are convergence producing; (2) convergence of an air parcel occurs downstream after the parcel encounters a favorable isobaric configuration; and (3) a high percentage of the volume of moisture entering a region of convergence falls as precip. Pt. 2 is concerned with the development and application of a method of short range (6-hour) precip. forecasting. Synoptic evidence which supports the results of Pt. 1 is given. It is brought out that large regions of moist air enter shallower regions of cyclonicity and that these areas of cyclonicity can indicate regions of heavy precip. It is further indicated that the present observational network provides a sufficiently detailed analysis to locate closely many precip. areas. Pt. 3 describes the development and field testing of a

longer range (24-hour) quantitative precip. forecasting technique. The results of the fie testing further support the hypotheses set forth in Pt. 1. The results of using day-to-da maps show that sufficiently accurate sea level prognostic charts can be prepared and that th technique can be applied in a short time with enough accuracy to be of synoptic value. Pt. describes the development and application of a 6-hour precip. forecasting technique for hurr canes. Observed sea level pressure maps for past hurricanes were used. The results a encouraging and indicate that the technique is valuable, provided that a reasonably accura short range forecast of the sea level pressure field can be made. It is generally concluded tha the application of the results of Pt. 1 to 6-hour and 24-hour forecasts shows a considerab degree of skill at quantitative precip. forecasting. *Subject Headings:* **1. Precipitation forecas ing 2. Synoptic analysis 3. Short range forecasting 4. Quantitative precipitation forecastin** —*Authors' abstract.*

12.10–338 551.509.324.2:551.577.37(521.7 521.6 521.

Ninomiya, K., **On the heavy rainfall in the Kinki, Tōkai and Hokuriku Districts duri August 12–13, 1959.** *Journal of Meteorological Research*, Tokyo, 13(1):47–52, Jan. 196 14 figs., 5 refs., 11 eqs. In Japanese. **DWB, DLC**—In order to search for the causes of hea rainfall (max. 400 mm) in the Kinki, Tokai and Hokuriku Districts during Aug. 12 to 13, 195 the author investigated Typhoon No. 6 which was mixed with a tropical cyclone and broug heavy rainfall into Kyushu on the night of Aug. 11 and Typhoon No. 7 that passed throu mid-Honshu. Investigation included an intensified migration of front line and a variation temperature gradient by means of equation studied by PETTERSSEN and YANAI, and also ascending current and instability as well as the concentration of water vapor and formation o tongue-shaped humidity region. It is concluded that the main cause of heavy rainfall w largely related to an intermixture of perpendicular advection of water vapor added to a ho zontal advection in the process of humidity increment moving toward the ascending curre *Subject Headings:* **1. Rainfall forecasting 2. Synoptic conditions for heavy rainfall 3. Japa** —*Author's abstract.*

12.10–339 551.509.324.2:551.509.335(522

Ogawa, Y., **Basic investigation for rainfall forecast at Kagoshima, Pt. 2.** *Journal Meteorological Research*, Tokyo, 12(3):169–175, March 1960. 7 figs., 4 tables, ref. In panese. **DWB, DLC**—In order to investigate monthly variation and annual trend of rainf divergence, the author attempted to obtain a correlative frequency from annual mont rainfall amount using Pearson's correlation formula. It illustrates the method for obtaini an analogous trend based on yearly variation of correlation coefficient (Fig. 1), analog trend with the use of periodic analysis and correlation between variable numbers, and of da rainfall amount and frequency based on different ranges (Tab. 4). *Subject Headings:* **1. Ra fall forecasting 2. Pearson's formula 3. Kagoshima, Japan.**—*K.C.*

12.10–340 551.509.324.2 551.509.318:551.577.32(4

Volevakha, N. M., **O prognoze razlichnykh vidov osadkov v kholodnoe polugodie Ukraine.** [Prediction of various types of precipitation in the cold season in the Ukrain *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 7:67– **1957.** 2 figs., 2 tables, 6 refs. **DWB**—Investigation of conditions under which precipitat of various types occur permits ascertainment that the decisive factor that determines phase state of precipitation is temperature regime of the air in the lower layer of the atm sphere. In the present article an attempt is made to establish certain forecasting relations different kinds of precipitation. The precipitations are divided into two main groups: occurring at negative temperatures of the air and another for the positive ones. These t groups in turn are subdivided into sub-groups. The method of further investigation is cussed. The recurrence of the phase state of precipitation is analyzed and illustrated w tables and graphs. Dependence of the phase state of precipitation on the magnitude of relat geopotential and the air temperature is considered as a factor that is applicable to all kinds precipitation. *Subject Headings:* **1. Precipitation type forecasting 2. Winter precipitat forecasting 3. Ukrainian S.S.R.**—*B.J.G.*

12.10–341 551.509.317:551.578.46:551.547.5(521.1)

§Yamashita, H., **On the forecasting of snow limit in the southern part of Tōhoku District based on the 700–1000 mb thickness.** *Journal of Meteorological Research*, Tokyo, 12(7):446–54, July 1960. 13 figs., 3 tables, 11 refs. In Japanese; English summary p. 446. **DWB, DLC**—In order to forecast the precipitation form in the southern part of Tōhoku district, the author researched on the relation between the precipitation form in that district and the 700–1000 mb thickness at Sendai. The thickness in which the probability of occurrence of frozen precipitation form is equal to that of unfrozen form, which was named the equal-probability-thickness, was affected by the geographical height, the latitude and the geographical conditions. Among the geographical conditions, the roughness of topography was less effective than the continentality represented by the least distance to the coast, but the snow cover was considerably effective, especially in the inland basin. *Subject Headings:* **1. Snow limit forecasting 2. 700–1000 mb thickness chart 3. Tohoku District, Japan.**—*Author's abstract.*

12.10–342 551.509.324.2:551.577.21:551.515.8

Yasuda, K., **An estimation of precipitation amount due to cold front.** *Journal of Meteorological Research*, Tokyo, 12(8):524–529, Aug. 1960. 5 figs., 3 tables, 3 refs., 6 eqs. In Japanese; English summary p. 524. **DWB, DLC**—The precipitation amount due to the ascending current along the frontal surface was estimated by the following equation,

$$R = -\int_t^{t+\Delta t}\int_{p_f}^{500} Fw\frac{dp}{g}\,dt.$$

The air column was divided into four layers in order to perform the integration. The example shown in this paper and some tests in routine work show that the estimation by this method is useful, but has some tendencies to overestimation of the observed amount. *Subject Headings:* **1. Precipitation estimation 2. Cold front effects on precipitation.**—*Author's abstract.*

Ice Accretion (551.509.324.3)

12.10–343 551.509.324.3:551.574.42

Volevakha, N. M. and Volevakha, V. A., **O vozmozhnosti prognoza nachala intensivnykh ololedoobrazovanii.** [Possibility of predicting the beginning of intensive glazed frost formation.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 12:81–87, **1958.** 2 tables, 3 refs. **DWB**—Article opens with a new conception of forecasting methods. The basis of this new method is explained in detail, with the emphasis on forecasting the beginning of the phenomena. Conditions for forecasting the beginning of glazed frost formation are discussed. Certain examples of the phenomena are given, discussed and analyzed. Based on this analysis, the method offered by the authors is formulated at the conclusion of the article. *Subject Heading:* **1. Glazed frost forecasting.**—*A.M.P.*

Fog and Visibility (551.509.325)

12.10–344 551.509.325

Kennington, C. J., **An approach to the problem of forecasting of fog clearance.** *Meteorological Magazine*, London, 90(1,064):70–73, March **1961.** 4 tables, 6 refs. **DWB, DLC**—A table has been constructed giving the total insolation received at the top of a thick fog layer up to a given time of the day. This has been compiled by assuming that the "Gold square" maximum temperature will be reached by 1430 hours, taking proportional parts of the insolation available, allowing for the sun's elevation, for each hour, summing progressively and finally allowing for 60% reflection. To forecast the time of clearance it is first necessary to forecast the clearance temperature, T_2. The amount of energy required to reach this temperature for dry air is then computed from a tephigram. Finally a factor F is added to allow for the energy required to heat and evaporate the liquid content of the fog. The time by which this corrected insolation will have become available is read from the table. A formula for F is derived as $F = \frac{T_1+T_2}{60} + \frac{2}{3}$ where T_1 is the actual surface temperature. *Subject Heading:* **1. Fog clearance forecasting.**—*R.B.*

12.10–345 551.509.325:523.

Roncali, G., **Previsioni meteorologiche sulla visibilità dell'ecclisse solare totale del febbraio 1961.** [Meteorological forecasts of visibility for the total solar eclipse of Feb. 1 1961.] *Coelum*, Bologna, 28(7/8):117–118, July/Aug. **1960.** fig., 4 refs. **DLC**—In t northern section of Italy a notably less than medium cloud cover might be expected during t second 10 day period, in February 1961, as compared with the preceding and following decad The prediction is based on the evaluation of observations covering fifty years from 1901–195 *Subject Headings:* **1. Visibility forecasting for eclipse of Feb. 1961 2. Solar eclipse, Feb. 196** —*E.K.*

12.10–346 551.509.3

*U. S. Air Weather Service, **An objective approach to short range forecasting of certa minimum conditions of ceiling and visibility at Richards-Gebaur AFB, Missouri.** Prepar by Detachment 1, 19th Weather Squadron. April 10, **1960.** 23 p. 3 figs., 4 tables. R production of typescript. **DWB** (M09.325 U581obr)—Suggestions are made as to h objective aids may be utilized for the short range forecasting of certain ceiling and visibili minimums at Richards-Gebaur AFB, Missouri. A statistical study was made to determi if and when conditions of ceiling less than or equal to 1500 feet and/or visibility less than equal to 3 miles will occur with the passage of a surface cold front. An additional study w made to learn the persistence, regardless of cause, of 1) ceiling less than or equal to 1500 f and/or visibility less than or equal to 3 miles, 2) ceiling less than or equal to 500 feet and/ visibility less than or equal to 1 mile, and 3) ceiling less than or equal to 100 feet and/or vi bility less than or equal to ½ mile. Separate studies were made for each season. Data a included in tables and graphs. *Subject Headings:* **1. Short range forecasting 2. Ceiling a visibility forecasting 3. Richards-Gebaur AFB, Mo.**—*E.Z.S.*

Thunderstorms (551.509.326)

See also: **Objective method for forecasting thunderstorms, Truax Field** (Ardis), 12.10–255.

12.10–347 551.509.326:551.515.4(73

Cox, Myron K. (*U. S. A. F., Air Weather Service*), **A preliminary investigation of thund storm occurrence in eastern Virginia.** *American Meteorological Society, Bulletin*, 42(2):10 108, Feb. **1961.** 2 figs., 4 tables, 4 refs. **DWB, DLC**—The forecast method described, show a high correlation between occurrence and non-occurrence of cloud development over east Virginia. A new stability value is presented as a convective forecasting facility. The d tribution of the meteorological parameters prevented a distinction between the various weat classifications. The complex nature of the thunderstorms prevented a specific location fo cast. The forecast method described had an overall verification probability with depend and independent rate of 0.88 and 0.92, respectively. *Subject Headings:* **1. Thunderstor forecasting 2. Forecast verification 3. Virginia.**—*A.H.K.*

Tropical Cyclones, Hurricanes and Storms (551.509.327)

12.10–348 551.509.327:551.51

Tomitaka, S. (*Fukuoka Met. Obs.*), **On the meteorological elements' distribution in t region of the typhoon, Pt. 1.** *Meteorological Society of Japan, Tokyo, Journal, Ser.* 2, 38(3):16 173, June **1960.** 13 figs., 4 tables, 11 refs., 36 eqs. English summary p. 161; Japanese su mary p. 173. **DWB, DLC**—A formula of gradient wind velocity and relative vorticity typhoon is derived, assuming that the pressure distribution at sea level is circular in the reg of the typhoon. And the distribution of the wind velocity is derived by introducing the val from the above-mentioned formula to the general solution of equation of motion in the friction layer as the function of the height and the distance from the center. The height of friction influence and the value of the other elements are estimated for the region of the typho These calculating methods are tested with the synoptic data about Typhoon No. 12 (Ju which invaded Kyushu District in 1954. *Subject Headings:* **1. Typhoon No. 12 (1954) 2. T phoon forecasting 3. Kyushu District, Japan.**—*Author's abstract.*

Miscellaneous Phenomena (551.509.329)

See also: **Fallout predictors** (Bailey et al.), 12.10–113.

12.10–349 551.509.329:551.511.12:551.501.7

Belousov, S. L., **K prognozu geopotentsiala na severnom polusharii v sluchae baroklinnoĭ atmosfery.** [Forecasting the geopotential of the Northern Hemisphere in the case of a baroclinic atmosphere.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 93:25–34, **1960.** Bible, 4 refs., 36 eqs. **DWB**—In 1956, E. N. Blinova proposed a method for the solution of the nonlinear problem of planetary scale atmospheric movements which permitted the precomputation of the geopotential at various levels over the entire Northern Hemisphere. The present article suggests a scheme of computation for spatial nonlinear forecasting problem based on the methodology of Blinova taking into consideration the experience gained in solving similar problems by electronic computing machines. A lengthy mathematical discussion then follows. Thirty-six mathematical expressions are given. Two formulas are now being used for making experimental computations. *Subject Headings:* **1. Geopotential computations 2. Blinova's method 3. Northern Hemisphere.**—*M.B.G.*

12.10–350 551.509.329:551.542

Diubiuk, A. F., **Uchet v prognoze baricheskogo polia nachal'nykh dannykh dvukh srokov.** [Taking into account initial data from two terms in forecasting the pressure field.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 93:38–48, **1960.** ref., 41 eqs. **DWB**—Due to the turbulent character of the field of velocities, it would be of interest to obtain a solution for the system of equations of hydrodynamics and thermodynamics in such a form that instead of initial velocities or instead of derivatives from pressure for time at the initial moment, the values for pressure at several initial periods would be included. A system of equations is introduced, followed by a detailed discussion and explanation of the mathematical computations and processes involved. *Subject Heading:* **1. Pressure field forecasting.**—*M.B.G.*

12.10–351 551.509.329:551.465:551.507.2

Koido, H. and Hanzawa, M., **Trial wave forecasting with the data of the Ocean Weather Station Extra "X."** *Journal of Meteorological Research*, Tokyo, 12(10):703–708, Oct. **1960.** figs., table, 5 refs. In Japanese; English summary p. 703. **DWB, DLC**—Wave forecasting actually a wave hindcast) by Sverdrup-Munk's method with the data of the Ocean Weather Station "X" (Extra) was carried out for the period of 1952. Since the data are considered to be more reliable and exact than the data obtained on ordinary merchant ships, the authors studied an applicability of the said method. The results are as follows:—1) A bit technique is needed in taking the mean wind velocity of the fetch. 2) Careful treatment is needed for the calculation of the geostrophic wind. 3) When a forecast value of wave height exceeds 6 m, special consideration is necessary. *Subject Headings:* **1. Ocean wave forecasting 2. Ocean Weather Station "Extra."**—*Authors' abstract.*

12.10–352 551.509.329:551.511.12:551.501.7

Romov, A. I., **O granichnykh znacheniiakh geopotentsiala v zadache chislennogo resheniia uravneniia vikhria.** [Boundary values of geopotential in the numerical solution of the vorticity equation.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 17:31–39, **1959.** 4 figs., 3 tables, 8 refs., 11 eqs. **DWB**—The short range forecasting of the geopotential at the mean level by means of electronic computers is based upon the numerical solution of the barotropic vorticity equation $\Delta \frac{\partial z}{\partial t} = -\frac{g}{t}(z, \Delta z) - \partial \frac{\partial z}{\partial x}$ where z = height of isobaric surface, t = time, x and y = horizontal axes of coordinates directed respectively along the latitude to the east and along the meridian to the north, g = acceleration of gravity and C = Coriolis parameter. And in this study the author examines several attempts to compute approximately the function $\partial z/\partial t$ at the boundary of a region by extrapolation on the basis of adjacent nodal points of a square grid. The geopotential at the boundary of a

region is computed most accurately by extrapolation with the aid of the formula

$$\left(\frac{\partial z}{\partial t}\right)_3 = -\left(\frac{\partial z}{\partial t}\right)_1 - \left(\frac{\partial z}{\partial t}\right)_2 - \left(\frac{\partial z}{\partial t}\right)_4 + \sum_{i=5}^{8}\left(\frac{\partial z}{\partial t}\right)_i$$

and

$$\left(\frac{\partial z}{\partial t}\right)_6 = 1.4\left[\left(\frac{\partial z}{\partial t}\right)_1 + \left(\frac{\partial z}{\partial t}\right)_2 + \left(\frac{\partial z}{\partial t}\right)_3 + \left(\frac{\partial z}{\partial t}\right)_4\right] - 1.6\left(\frac{\partial z}{\partial t}\right)_0 - \left[\left(\frac{\partial z}{\partial t}\right)_5 + \left(\frac{\partial z}{\partial t}\right)_7 + \left(\frac{\partial z}{\partial t}\right)_8\right]$$

The result of extrapolation of the amount of the geopotential is improved as the intervals of t grid are decreased. From calculations for actual isallohypse maps and analysis of the erro it follows that each of two methods of extrapolation of variation of the geopotential is super to the present day use of a constant geopotential at the boundary of a region. The fi formula can be used with a nodal grid having an interval less than 250 km. For a grid with interval of 250–300 km the two formulas can be combined. *Subject Headings:* **1. Geopotent height 2. Barotropic vorticity equations 3. Numerical short range forecasting.**—*Autho conclusions and I.L.D.*

12.10–353 551.509.329:551.515.2:551.46

Tomczak, Gerhard, **Über die Genauigkeit der Sturmflutvorhersage für die deutsc Nordseeküste.** [Accuracy of storm surge forecasts for the German North Sea Coas *Deutsche Hydrographische Zeitschrift*, Hamburg, 13(1):1–13, Feb. **1960.** 5 figs., 4 tables, refs. German, English and French summaries p. 1. **DWB**—For six storm surge peri and one period of stormy off-shore winds in winter 1958/59, hourly values of water level calculated by means of the data used by the Storm Surge Warning Service of the Germ Hydrographic Institute. The method, explained in detail by an example, permits to set u true forecast of storm surges for 7 hours in advance. A comparison is made between obser and predicted hourly values of storm surges, the standard error in 1104 cases being ±15.4 Ninety percent of the errors do not exceed ±25 cm. The method of reduction curves u for the computation of tides in predicting storm surges, is compared with the procedure propo by J. R. Rossiter (1959). Besides, the ratio of wind effect at low water to that at high wa under equal meteorological conditions that has likewise been used in the computation of wa levels, is subjected to a closer discussion which helps to reveal the importance to be attribu to the difficult topographical conditions (tidal flats) in the interior part of the German Bi and their influence on the development of local wind effect occurring immediately on coastal foreland. *Subject Headings:* **1. Storm surge forecasting 2. Wind effects on st surges 3. Forecast verification 4. German North Sea Coast.**—*Author's abstract.*

LONG RANGE FORECASTING (551.509.33)

See also: **Conf. for medium and long range forecasting over plateau region** (Lu-Wu), 12.10–56; **Numerical prediction and general circulation** (Charney), 12.10–271; **Long range forecasting considering vertical stratification and turbulent mixing** (Mashkovich, Khelfets), 12.10–278; **Forecasting climatic fluctuations** (Von Neumann), 12.10–282.

12.10–354 551.50

Arléry, R., **A propos des prévisions météorologiques à longue échéance.** [Long ra weather forecasts.] *Bulletin des Engrais*, Paris, No. 429:101–103, May **1960.**—The au forewarns the public against associations or societies which boast that they are able to exact long range weather forecasts. He enumerates the difficulties involved in making range forecasts and exposes clearly the reasons for their partial failures. He recalls the st ment made by the American Meteorological Society in September 1957. The possibil of meteorology in the field of long range forecast remain subordinate to the discovery o true conditions influencing the general atmospheric circulation and the precise mechanis their behavior. The methods of investigation open to scientists dealing with this study

mproving. The most recent one, the meteorological satellite, is the most promising and it s conceivable that the information these valuable auxiliaries provide will certainly supply reater help than the desperate research after hypothetic intermonthly or interseasonal correlaons. *Subject Headings:* **1. Long range forecasting 2. Long range forecast improvement.** *-A.V.*

12.10–355 551.509.33:523.746:551.524.32

Baur, Franz, **Gedanken zur langfristigen Witterungsvorhersage-Aussichten für den Winter 1960/61.** [Reflections on long range weather forecasting—prospects for the winter 1960/61.] *Naturwissenschaftliche Rundschau*, Stuttgart, 13(12):470–473, Dec. 1960. 2 tables. **DWB, DLC**—On the basis of an analysis of the dependence of the temperature characteristics a winter upon its position within the sunspot cycle and the characteristics of large scale eather development in Sept. 1960, the author presents a long range forecast of the winter of 960–61. Tables are presented giving the mean temperature deviation of Central Europe uring winters which lay in the 3d, 4th, or 5th tenth of the descending branch of the sunspot ycle for the period 1771–1949; and the deviations of the mean morning atmospheric pressure or Potsdam and Moscow, deviations of the Sept. mean atmospheric pressure at Moscow from he long period mean, the deviations of succeeding winters in Central Europe, as an average f 3 and 4 stations, in years in which the three given pressure deviations were all positive and he decadal mean of pressure during Sept. 21–30 in Moscow was 2.0 mb greater than the mean or the period 1880–1960. The winter of 1960–61 will be moderately mild in Central Europe. wo to three cold waves will appear between mild periods; it is possible that one of these cold aves may last several weeks although this cannot be predicted with the same certainty that he winter as a whole will be milder than normal. The probability of the forecast that the inter will be warmer than normal is 97%, and that the winter will not be very cold is 90.1%. *ubject Headings:* **1. Long range forecasting 2. Winter weather forecasting 3. Central urope.**—*I.L.D.*

12.10–356 551.509.33

Brignone, Juan José, **Aspectos generales del pronostico a largo plazo.** [General aspects f long range forecasting.] *Sociedad Científica Argentina, Anales*, 169(56):63–82, May/June 960. **DWB, DLC**—The author discusses the problems associated with accurate long range orecasting. BAUER'S "action centers" and MULTANOVSKIĬ'S "natural periods" are mentioned s advancements; also the physical theory of evolution of different forms and positions of these ction centers proposed simultaneously by ROSSBY and BJERKNES is mentioned. Further dvancements would require world cooperation since a) the behavior of a center depends on at of other centers in the same hemisphere and b) the velocity of energy propagation of the tmospheric waves from one system to another takes place frequently at a velocity appreciably reater than the true velocity of air particles in any atmospheric layer observed. Statistical ethods consisting of tendencies, singularities, points of symmetry, meteorological types and nalogies are also valuable although not infallible; a brief description of each method is given. *ubject Headings:* **1. Long range forecasting techniques 2. Statistical methods.**—*A.L.M.*

12.10–357 551.509.33:551.511.1:551.513.1

Eliassen, Arnt (*Univ. Calif., Los Angeles*), **Remarks on the problem of long-range weather rediction.** (In: Pfeffer, Richard L. (*ed.*), **Dynamics of climate.** N. Y., Pergamon Press, 1960. . 37–43. 5 refs., 16 eqs.) **DWB, DLC**—A quasi-static theory is presented to predict the volution of the zonally averaged state of the atmosphere. It deals with the behavior of a ompressible fluid performing a circular vortex motion in a gravity field, the vortex being asumed to be near a state of balance at all times. Assuming heat sources and sinks, and frictional orces distributed symmetrically to the axis changing by time, a meridional circulation superposed upon the vortex motion will have the character of a forced oscillation of a quite omplicated type. The meridional motion will be determined from the requirement to maintain the state of balance despite the disturbing influences of the heat and angular momentum ources. Heating and friction are expressed by including the effects of large and small eddies ith consideration of the stream function for the meridional motion, which depends only on he sources of heat and angular momentum and on the structure of the vortex. The resulting

equation is applied in its elliptic form in accord to a stable vortex. To generate meridion circulations the sources of heat and angular momentum are accordingly disturbed. T determination of the general circulation for a long period can be expected. *Subject Headin* **1. Long range forecasting 2. General circulation theories 3. Quasi-stationary circulati** —*O.T.*

12.10–358 551.509.33:551.509.

Hwang, Shih-sung; Tang, Ming-min et al. (*all, Dept. Met., Nanking Univ.*), **A method predicting long-period sequences of synoptic processes by single-station data.** *Acta Meteo logica Sinica*, Peking, 31(2):138–149, May 1960. 8 figs., table, 10 refs. In Chinese; Engli summary p. 149. **DLC**—In this paper, a method of predicting long period sequence of synop processes by single-station data is suggested and tested. By this method, the prediction synoptic processes for any given month can be worked out as early as one year before. T tested results are satisfactory. *Subject Headings:* **1. Long range forecasting 2. Single stati forecasting.**—*Authors' abstract.*

12.10–359 551.509.33:551.511:551.51

Kheĭfets, Ia. M. and Shishkova, I. A., **Usovershenstvovanie metodiki dolgosrochno prognoza kart absoliutnoĭ topografii po barotropnoĭ modeli.** [Improving long range forecasti methods for absolute topography charts based on a barotropic model.] *Moscow. Tsentral'n Institut Prognozov, Trudy*, No. 93:16–24, 1960. 5 figs., table, 4 refs., 18 eqs. **DWB**—One the important directions in the development of the hydrodynamic method of long ran forecasting was the solution of the linear problem. The practical application of the theoreti results was made difficult due to the great amount of computation required. It was necessa for this reason, to limit initial data to the field obtained in the network of points for 15° lo and 5° lat. As a result, initial data may contain inaccurate characteristics of the baric fie and, as a consequence, the forecast will be too even. The proposal was made to increase density of initial data and the number of members of the basic equation. There follows a lo mathematical discussion related to the solution of the basic formula. A number of charts w isolines plotted are used to illustrate the discussion. In conclusion, the authors state that use of a larger number of members in the equation does appear to be superior to the form method. *Subject Headings:* **1. Long range forecasting techniques 2. Barotropic mod 3. Hydrodynamic forecasting techniques.**—*M.B.G.*

12.10–360 551.509.33:551.577.38(4

*Lowndes, C. A. S., **The forecasting of dry spells of three days or more at London and south-east England in May to October.** *Meteorological Magazine*, London, 89(1054):131–1 May 1960. 4+ figs., 10 tables, ref. **DWB, DLC**—Most of the dry spells are associated w a spread of high pressure from the south-west or west of the British Isles. Characteris preceding the dry spells are described and rules for forecasting dry spells here, are set for *Subject Headings:* **1. Dry spell forecasting 2. London, Eng.**—*E.Z.S.*

12.10–361 551.509.33:551.524.32(5

Novskaia, A. I., **Kharakteristika mesiachnykh anomaliĭ temperatury vozdukha po Sa halinu, Kamchatke, severo-zapadnomu i sevemomu poberezh'iam Okhotskogo moria.** [CH acteristic of monthly air temperature anomalies in Sakhalin, Kamchatka, the northwest and the northern coasts of the Okhotsk Sea.] *Dal'nevostochnyĭ Nauchno-Issledovatel' Gidrometeorologicheskiĭ Institut, Trudy*, No. 10:93–101, 1960. 2 figs., 4 tables, 4 refs. Russ summary p. 101. **DWB**—The author attempts to determine the characteristics of the tribution of monthly anomalies of atmospheric temperature and to clarify the relations between anomalies and normals of individual months in order to use these in forecast monthly temperature anomalies over Sakhalin, Kamchatka and the northwestern and north coasts of the Sea of Okhotsk. The distribution of the 20 stations whose data were use shown on a map and the sources of data are given. The deviations of the mean mont temperatures from the mean long period temperatures on Sakhalin, Kamchatka, and northern coast of the Sea of Okhotsk ranged from 0.1° to 12.3°C. The probability of deviati of mean monthly temperatures from the mean long period temperatures up to 1.0° and m

nan 1.0°C is almost equal; the deviation above 1.0°C is observed relatively more frequently (10–16%) on the coasts of the Sea of Okhotsk and on the northern half of the Kamchatka region. Among the deviations exceeding 1.0°C the most frequent are deviations of 1.1°–2.0°C and the least frequent are those above 4.0°C; deviations exceeding 4.0°C occur only during the cold half of the year. On Sakhalin and the Okhotsk coasts positive anomalies are more frequent than negative ones. In Kamchatka region positive anomalies predominate during the cold half of the year and negative anomalies during the warm half of the year; on the western and northwestern coasts; in the valley of the Kamchatka River and on the southeastern coast of Kamchatka positive anomalies predominate. Relationships were established between individual months (initial months) and subsequent months; these can be used to forecast temperature anomalies on the Sea of Okhotsk, Sakhalin and Kamchatka. *Subject Headings:* **1. Temperature anomaly forecasting 2. Monthly temperature anomalies 3. Okhotsk Sea coast.**—*Transl. of author's summary & I.L.D.*

12.10–362 551.509.33:551.577.32(52)

Takenaga, K., **Grosswetter forecasting by the correlation chart: weather type and broad-scale correlation in Bai-u season.** *Journal of Meteorological Research*, Tokyo, 12(6):343–349, June **1960.** 11 figs., table, 11 refs. In Japanese; English summary p. 343. **DWB, DLC**—In this report preliminary investigation on long range forecasting by the correlation chart is described and the Bai-u season is treated as a model case. The result is summarized as follows: (1) In Bai-u season, four typical types of 500 mb height isanomal (Figs. 6 to 9) show the remarkable characteristics in relation to precipitation and temperature at Fukuoka and typhoon formation (Table 1). (2) The distribution chart of correlation coefficient between monthly precipitation in the northern part of Kyushu and 500 mb height may be used to estimate the monthly precipitation from 500 mb prognostic chart (Figs. 1 and 2). (3) The distribution chart of correlation coefficient between 500 mb heights at 40°N, 120°E and at other points in the Northern Hemisphere shows the existence of the relation between the actions of far distant places associated with the blocking. *Subject Headings:* **1. Weather types 2. Long range forecasting techniques 3. Correlation charts 4. Bai-u 5. Japan.**—*Author's abstract.*

Correlation in Time and Space (551.509.331)

12.10–363 551.509.331:551.524.32(4)

*Teich, M., **Prognostisch verwertbare Beziehungen zwischen den Temperaturanomalien dreier Folgemonate einiger langer Reihen in Mitteleuropa.** [Interrelationships between temperature anomalies of three consecutive months in several longer series in Central Europe applicable to forecasting.] *Zeitschrift für Meteorologie*, Berlin, 14(5/6):120–136, May/June **1960.** 14 figs., 6 tables, 6 refs. German and English summaries p. 120. **DWB, DLC**—From temperature observational series of nearly 200 years (Berlin, Prague-Clementinum, Budapest) significant relations between the anomalies of three consecutive months are found. Using mean pressure charts of the appropriate months the attempt is made to bring some light to the synoptic-physical background of rules which are simultaneously applicable and whose evidence reveals the same tendencies. *Subject Headings:* **1. Temperature anomalies 2. Long range forecasting techniques 3. Central Europe.**—*Author's abstract.*

Analog Methods (551.509.335)

See: **Basic investigation for rainfall forecast, Kagoshima** (Ogawa), 12.10–339.

Climatic Singularities (551.509.338)

12.10–364 551.509.338:551.583.14(52)

Nagao, T., **Similarity between singularity and climatic variation, Pt. 2.** *Journal of Meteorological Research*, Tokyo, 12(11):765–775, Nov. **1960.** 8 figs., 4 refs. In Japanese; English summary p. 765. **DWB, DLC**—In view of the study of singularity, the distribution of three elements such as pressure, temperature and precipitation for the particular calendar days and month having similar surface pressure pattern were compared in 3 cases classified

according to the annual mean sunspot number. The obtained results are as follows: (1) T distributions of monthly mean values for three elements in April are nearly analogous to that particular calendar days such as April 4 and 8 in the 3 cases. (2) The distribution of differen between monthly mean value of elements in the maximum sunspot number period and that the minimum sunspot number period for April is analogous to that for April 4 and 8. (3) T same result corresponding to (1)–(2) was concluded for August and June 11. Namely, t effect of increase or decrease of sunspot number of the secular variation of distribution elements on particular calendar day is similar to that in corresponding month. *Subject Hea ings:* **1. Climatic singularities 2. Japan.**—*Author's abstract.*

12.10–365 551.509.338:551.583.14(5

Nagao, T., **Similarity between singularity and climatic variation, Pt. 3, Secular variati of weather on singularity day.** *Journal of Meteorological Research*, Tokyo, 12(12):847–8 Dec. **1960.** 18 figs., table, 12 refs. In Japanese; English summary p. 847. **DWB, DLC** In this paper are discussed the secular variations of daily mean temperature and precipitati on the singularity days such as April 6, 23 and June 11 and on the particular calendar da such as April 4 and 8. And the following results were obtained. (1) The secular variatio on April 6 and 23 are similar to that in June during when the rainy weather accompanied front along the southern coast of Japan is frequently observed. The pattern showing t spatial distribution of the degree of similarity between the secular variation on April 23 a that in June shifts southwards by about 200–300 km in comparing with that for April 6, a this agrees with the results obtained from "Turbulence Theory of Singularities." (2) T secular variations on April 4 and 8 are similar to that in April during when the cyclones f quently pass through along the southern coast of Japan. (3) The secular variation on June is highly similar to that in August during when the anticyclone prevails over south sea of Jap (4) In general, the secular variation relates closely to the range of frequency distribution daily mean temperature and the prevailing pressure pattern. *Subject Headings:* **1. Clima singularities 2. Japan.**—*Author's abstract.*

Single Station Forecasting (551.509.34)

See also: **Long-period sequences predicted by single-station data** (Hwang et al.), 12.10–358

12.10–366 551.509.34:551.509.31(5

Lu, Wo, **Ob utochnenii prognozov pogody po odnomu punktu.** [Improving single stat weather forecasts.] *Meteorologiia i Gidrologiia*, Leningrad, No. 2:11–15, Feb. **1960. DW DLC**—The author tells about a method of improvement of weather forecasts first used by Chzhesiun (Yunnan Province) climatological station in China in 1957. The improvement forecasts is made on the basis of synoptic situation and weather forecasts drawn up by meteo logical observatories, with a detailed consideration of changes in meteorological elements, weather phenomena occurring at the given station. Information on the influence of station's topography on weather, local indications of weather changes, as well as popular si of these changes should be taken into account in the preparation of the improved weat forecasts. *Subject Headings:* **1. Weather forecasting methods 2. Single station forecast 3. Chzhesium, Yunnan Province, China.**—*A.M.P.*

FORECAST SERVICES AND VERIFICATION (551.509.5)

See also: **Numerical forecasts with two- and three-parameter models** (Knighting), 12.10–276.

12.10–367 551.509.5:551.509

*Berlin. Freie Universität. Institut für Meteorologie und Geophysik. **Examinatio 24 hours prognostic surface charts and punching of grid points of upper air mean contour cha** Contract DA-91,591-EUC-1159, Final Technical Report, June 15, 1959–June 15, **1960.** 1 10 tables, 2 refs. **DWB**—The present contract comprises two problems: a) checking of pr

ostic charts and b) punching of grid-point data from mean upper-air charts for a 5-year and a)-year period. While b) presents a purely technical problem, a) called for the development f new methods. The general practice of the past was to compare the entire pressure field of a rognostic map with the occurred pressure distribution and to express the result by one signifi- ant number (Bleeker's formula); this was not done in the present research. Centers of yclones and anticyclones were considered exclusively in order to connect the pressure field ith actual weather. First an analogous comparison between prognosis and reality was made y determining the difference between predicted and occurred central pressures; besides, the ifferences in position of the pressure centers were also determined and statistically elaborated. n this way, the practical success of a prognosis can be ascertained; however, it is not possible o state why a series of forecasts is good or not since this method does in no way allow for the pecial aspects of weather development. To eliminate these shortcomings, one has to start ut from that particular time at which the initial situation prevailed on which the forecast is ased. Then the occurred changes during the time over which the forecast extends have to be ompared with the predicted changes. Simple statistics on these parameters are not likely o yield sufficient information but may even lead to wrong conclusions. The stochastic elation between predicted and occurred changes must be accounted for. These demands re met in a simple way by the "new" method outlined in *Special Technical and Scientific Report*, No. 1. By means of this method quality characteristics can be determined similar to orrelation principles which quantitatively separate the deterministic from random shares in a ollective of pairs of predicted and occurred changes. It is also possible to find out to what xtent special problems in forecasting have been mastered by the European weather services. he originally intended computation of statistical parameters for periods of one month accord- ng to the old method was discontinued toward the end of 1959. The new method was applied y means of punchcard facilities. After the completion and trial of all technical expedients, rst investigations were made for a nine-month period about which details are reported under .5. *Subject Headings:* **1. 24 hour prognostic charts 2. Upper air mean contour charts . Punching grid points.**—*Author's abstract.*

12.10–368 551.509.5 551.582.2(851)

Calzada Benza, José, **El clima del presente invierno (1959).** [Climate of the current 959 winter.] *Revista Meteorológica del Peru*, Lima, 4(8):19, Dec. **1959. DWB** (M(05) 3454pe)—The author tabulates the temperature and humidity forecasts, based on studies uring the past 28 years, given at the end of May 1959 for the winter months (June, July and ugust), and compares them with the actual records. The temperature error was only 0.21°C or the winter average while the humidity was 0.5% off for the winter average. The forecasts or temperature and humidity were included for the coming September. *Subject Headings:* . **Winter temperature forecasting 2. Forecast verification 3. La Molina, Peru.**—*A.L.M.*

12.10–369 551.509.5:551.509.318:519.24

Gleeson, Thomas A. (*Florida State Univ.*), **A statistical theory of meteorological measure- ments and predictions.** *Journal of Meteorology*, Boston, 18(2):192–198, April **1961.** 3 figs., tables, 17 refs., 49 eqs. **DWB, DLC**—A statistical theory of synoptic-scale measurements nd predictions is developed and presented with the aid of numerical examples. In place of standard meteorological variables which are important in classical theory, there are a priori robability distributions of these variables in the present theory. The probabilities are for neasured and predicted values to differ from hypothetically true values by specified amounts. hese differences generally must be regarded as minimal because complexities of atmospheric henomena cannot be completely observed or encompassed in prediction procedures. The inimum-error, maximum-probability distributions are Gaussian with standard deviations lependent on observation-network densities. Classical kinematic and dynamic equations are sed in prediction to transform initial probability distributions into final ones. The procedure s very similar to procedures of quantum mechanics and statistical mechanics, as is illustrated y a numerical example. It is shown that uncertainties associated with forecasts of unstable henomena can be described quantitatively by the theory. The theory is general and capable f wide use. Classical deterministic methods are limiting cases of it. *Subject Headings:* . **Statistical theory of forecasting 2. Forecast verification.**—*Author's abstract.*

12.10–370 519.241.1:551.509

Gringorten, Irving I. and Sissenwine, Norman (*both, AF Camb. Res. Center, Mass.*) **Correlation coefficients and prediction accuracy.** *Journal of Meteorology*, Boston, 17(4):462–463, Aug. 1960. table, 2 refs., eq. **DWB, DLC**—This note presents comparative values of forecasts by climatology, persistence, and the best combination of both. Calculations from given equations show the reduction of error of forecast. One column gives the reduction of error of persistence, as a percent of the error of climatology. Another column gives the reduction of error of the weighted combination, $rx_0+(1-r)\bar{x}$, as a percent of the error of climatology. The last column gives the improvement of the best combination of climatology and persistence over persistence alone. *Subject Headings:* **1. Correlation coefficients 2. Forecast accuracy 3. Weather parameter forecasting 4. Least square estimates.**—*E.Z.S.*

12.10–371 551.509

Hofmann, Alfred (*Offenbach a. M.*), **Die Struktur von Druck-Vorhersagen: ein Beitrag zur Frage der Vorhersageprüfung.** [The structure of pressure forecasts: a contribution on the problem of forecast verification.] *Meteorologische Rundschau*, Berlin, 13(6):182–184, Nov.–Dec. 1960. 2 tables. German summary p. 182. **DWB, DLC**—The effectiveness of a forecasting procedure and the quality of forecasts can be determined, not only from an individual prediction, but also from a sufficiently large collection of forecasts which is characterized by a single prediction out of a large number of forecasts. The number of its terms is fundamentally unlimited. It forms a time series whose length is to be so selected that the collection is representative. Successive terms are connected through persistence. If prediction and reality are verified there is obtained a geographical distribution of the effectiveness of the forecasting procedure used. The verification involves the use of the correlation coefficient and the structure of the frequency distribution of both series. The latter is represented by the ratio σ'/σ of both dispersions. Values of r and σ'/σ for a forecast at the point 50°N, 10°E are presented. *Subject Headings:* **1. Forecast verification 2. Persistence.**—*I.L.D. & author abstract.*

12.10–372 551.509.5:551.578.48:624.1

La Chapelle, E. R. (*U. S. Forest Service*), **Recent progress in North American avalanche forecasting and control.** *Journal of Glaciology*, London, 3(28):679–685, Oct. 1960. 3 photos, 16 refs. **DWB, DLC**—The techniques of avalanche forecasting and control have found increasingly wide adoption in North America in the past decade. Numerous government and private agencies are now engaged in work to protect ski areas, highways, railroads and power lines. Practical control measures such as artillery fire have been developed to a high degree of effectiveness, but the construction of permanent defense structures other than snow sheds is still in its infancy. Experimental work on instrumentation, forecasting, defense structures and the use of explosives, artillery and jet aircraft is currently in progress. *Subject Headings:* **1. Avalanche forecasting 2. Avalanche control.**—*Author's abstract.*

12.10–373 551.509

La Gioia, Saverio, **Controllo delle previsioni meteorologiche.** [The control of meteorological forecasting.] *Rivista di Meteorologia Aeronautica*, Rome, 20(1):33–51, Jan./Mar. 1960. 4 figs., 3 tables. Italian, French, English and German summaries p. 33. **DLC**—The importance of weather forecast control is pointed out, in connection with the particular interests of both forecaster and user, or, more generally, with those of the emitting Weather Bureau with regard to the service efficiency. After a statement of the bases of the method, general rules are laid down to check all types of forecast, and two percent indexes for quality are arrived at: one including four values, and another, of a synthetical kind, having but one value. The procedure is described thereafter, to evaluate the quality of a forecast, also with reference to the more or less considerable difficulties of the forecast, in a given meteorological situation, or generally in a given month or season. Finally, the way to carry out the procedure is described and a few examples are given by checking various types of forecast. *Subject Heading:* **1. Forecast evaluation.**—*Author's abstract.*

12.10–374 551.509.5:551.482

Rangarajan, R. (*Central Water and Power Commission, New Delhi*), **A new approach to peak flow estimation.** *Journal of Geophysical Research*, Wash., D. C., 65(2):643–650, Feb. **1960.** figs., 4 tables, 2 refs., 5 eqs. **Discussion** by M. A. Benson, *Ibid.*, 65(8):2557, Aug. **1960. Reply** by Rangarajan, *Ibid.*, 65(9):3021–3022, Sept. **1960. Discussion** by Simeon M. Berman. *Ibid.*, 65(10):3615–3616, Oct. **1961.** 6 refs., 3 eqs. **DLC**—The usual flow prediction methods so far advanced proceed by considering each year's data as constituting a sample. They do not take due account of the nonrandom nature of the daily flow in a year. This paper outlines a different method in which less restrictive assumptions are made and proper account of the seasonal and intercorrelation effects is taken. Actual application of the method is illustrated by an example. *Subject Headings:* **1. River flow estimates 2. River flow forecasting techniques.**—*Author's abstract.*

12.10–375 551.509.5

Schrank, Wilburn R. (*Chanute AF Base, Illinois*), **A solution to the problem of evaluating forecast techniques.** *American Meteorological Society, Bulletin*, 42(4):277–280, April **1961.** tables, 5 refs. **DWB, DLC**—The evaluation of the operational utility of new forecast techniques has presented meteorologists with a difficult problem for many years. Both the percent correct score and the commonly used skill score possess rather serious limitations which are discussed in this paper. Finally, a new evaluation score is proposed which retains most of the good features of the other two scores but does not retain their primary limitations. *Subject Heading:* **1. Forecast evaluation.**—*Author's abstract.*

12.10–376 551.509.5:551.509.25

§Shafer, R. J., **The "poor man's" numerical weather prediction system.** (In: George, J. J. et al., **Weather forecasting for aeronautics.** N. Y., Academic Press, **1960.** p. 267–275. figs., 2 tables.) **DLC**—A method of producing a prognostic pressure chart for any time period (method weakens beyond time periods greater than 30 hrs) is described in detail. From 500 mb and 850 mb pressures and temperatures the pressure change is computed and then entered on synoptic charts. An example (Jan. 12, 1958, 1900E) is given and is illustrated with synoptic charts. A table and figure, both containing the same information, for pressure change correlation is included. *Subject Headings:* **1. Numerical forecasting 2. Prognostic pressure chart preparation.**—*A.J.M.*

12.10–377 551.509.5:551.509.25

§Shafer, R. J., **Synthesis of a prognostic chart: an example.** (In: George, J. J. et al., **Weather forecasting for aeronautics.** N. Y., Academic Press, **1960.** p. 276–296. 16 figs.) **DLC**—A method of producing a prognostic chart is described in detail. Numerical, objective, and subjective techniques are used to varying degrees in producing the final chart. An actual synoptic situation (March 30, 1958, 1900E) is worked out, with reproductions of the actual worksheets and synoptic charts illustrating the method. *Subject Heading:* **1. Prognostic chart preparation.**—*A.J.M.*

12.10–378 551.509.5:551.509.311

Spiegler, David B. (*New York Univ., N. Y.*), **An analysis of barotropic forecast errors in cases of rapid sea level cyclogenesis.** *Monthly Weather Review*, Wash., D. C., 88(8):263–268, Aug. **1960.** 6 figs., table, 11 refs. **DWB, DLC**—The 24-hour 500 mb barotropic forecasts prepared by the Joint Numerical Weather Prediction Unit (JNWPU) have been investigated for 30 cases of rapid sea level cyclogenesis. Composite error maps are presented for the region of cyclogenesis. The 500 mb errors are found to be significantly larger when the solenoidal field at that level is strong than when it is weak. *Subject Headings:* **1. 500 mb barotropic forecasts 2. Sea level cyclogenesis 3. Barotropic forecast errors.**—*Author's abstract.*

12.10–379 551.509.5

Suzuki, E., **Reliability and utility value of weather forecast.** *Journal of Meteorological Research*, Tokyo, 12(2):61–67, Feb. **1960.** 9 tables, 17 refs. In Japanese; English summary

p. 61. **Discussion** by T. Watanabe and **Reply** by Suzuki, *Ibid.*, 12(12):920–922, **1960. DWB DLC**—As an actual example of utilization of weather forecast, success percentages of dew poin temperature warning were computed for several stations in order to apply it for the rus prevention of iron plate, and as the results, we could know such warning satisfactory as a rul Dew point temperature warnings are essentially apt to issue to excess owing to avoid th numerous losses of iron plate set by rust. Next, the optimum procedures similar to linea programming solution were formally offered to solve the following two problems: (1) the mos economical procedure on the acceptance of such dew warning based on the present probabilist weather forecast and (2) the same problem as (1) in the case of considering both weather fore cast and insurance for vital loss of iron plate set. *Subject Headings:* **1. Weather forecastin 2. Dew point-temperature forecasting 3. Rust prevention.**—*Author's abstract.*

12.10–380 551.509.5:551.50

U. S. Weather Bureau, **Plan for meeting meteorological observation requirements ov sparse data regions. By the Panel on Observations over Sparse Data Regions.** Its *Technic Planning Study*, No. 1, June **1960.** 51 p. figs., forms. **DWB** (M(051) U587te)—Th objectives of study were to (1) determine the relationship between forecasting accuracy ov the contiguous United States and the observational networks in sparse data areas, and (2) formulate alternative methods for obtaining meteorological data from one such area, namel the Pacific area between 25°N lat. and 55°N lat., and from the U. S. west coast to the date li 180°. The study is largely concentrated on the requirements for meteorological observatio over the "sparse data areas" of the world with primary emphasis on the Pacific Ocean, support of forecasting for 12 hours or more in advance. A summary of major findings an recommendations precede discussions of a definition of a suitable observational networ alternative methods for obtaining observations in sparse data regions, criteria for evaluating t various observational methods, quantitative weights assigned to the criteria for quality, a six alternative programs for meeting observational requirements. *Subject Headings:* **1. Met orological observations 2. Meteorological networks 3. Forecast accuracy.**—*E.Z.S.*

Hurricanes and Typhoons (551.509.57)

12.10–381 551.509.57:551.515.

Charlton, J. L. (*M. V. "Nassa"*), **Typhoons "Freda" and "Emma" [in the] western No Pacific Ocean.** *Marine Observer*, London, 30(190):185–187, Oct. **1960.** fig. **Comment** C. E. Tilden (*Typhoon Warning Center, San Francisco*), p. 187. **DWB, DLC**—This is a repo of the experiences of the M. V. "Nassa" during the period 8th–17th Nov. 1960. The tracks both "Freda" and "Emma" were plotted and also the positions of the various forecast trac received during the period. Tilden comments that none of the forecasts could have originat from his Center and goes on to comment on the improved accuracy of the typhoon forecas issued from San Francisco. *Subject Headings:* **1. Typhoon tracks 2. Typhoon forec accuracy 3. Typhoon "Freda" (1960) 4. Typhoon "Emma" (1960) 5. North Pacific.**—*R*

12.10–382 551.509.57:551.557.2:551.51

U. S. Joint Task Force Seven, **The use of streamlines and vertical cross sections typhoon analysis and forecasting.** Its *JTFMC TP*-21, June **1960.** 31 p. 17 figs., 15 r **DWB** (M15.2 U585us)—An extensively illustrated analysis of two tropical storms, Hurrica "Dot" of Aug. 1959 and Typhoon "Sarah" of Sept. 1959. The discussion illustrates the us streamlines and vertical cross sections for typhoon analysis and forecasting. The case Hurricane "Dot" was chosen as an example of an unusual storm in an area where such sto rarely occur. Typhoon "Sarah" was chosen as a typical large typhoon with poleward curvature. *Subject Headings:* **1. Typhoon analysis 2. Typhoon forecasting 3. Hurrica "Dot" (1959) 4. Typhoon "Sarah" (1959).**—*I.S.*

12.10–383 551.509.57:551.51

Vanderman, Lloyd W. (*Joint Numerical Weather Prediction Unit, Suitland, Md.*), **Verifi tion of JNWP-unit hurricane and typhoon forecasts for 1959.** *American Meteorological Soci Bulletin*, 42(4):239–248, April **1961.** 6 figs., 4 tables, 7 refs. **DWB, DLC**—During the 1

reason for tropical storms in the Northern Hemisphere, Joint Numerical Weather Prediction (JNWP) Unit computed operationally one or more forecast tracks for 11 hurricanes and tropical storms and 11 typhoons. The 500 mb barotropic forecast flow with the tropical vortex eliminated from the initial 500 mb analysis was employed as the steering current in obtaining these forecasts. A summary of 1959 forecasts and a table of verification of JNWP hurricane forecasts for the years 1956 through 1959 are presented. The improvement and deterioration in forecasts from one year to the next are discussed in terms of sample size, operational changes, and analysis and forecasting techniques specifically designed for forecasting trajectories of tropical cyclones. *Subject Headings:* **1. Forecast verification 2. Hurricane forecasting 3. Typhoon forecasting.**—*Author's abstract.*

Hydro- and Agrometeorological Forecasting (551.509.58)

12.10–384 551.579.5 551.509.58:551.579.4

Bouchardeau, A. and Rodier, J., **Nouvelle méthode de détermination de la capacité d'absorption en terrains perméables.** [A new method of determining the infiltration capacity of impermeable land.] *La Houille Blanche*, Grenoble, 15, Special No. A:521–527, July/Aug. 1960. 5 figs. French and English summaries p. 521. **DLC.** Also issued in *Société Hydrotechnique de France, Mémoires et Travaux*, Vol. 1:87–93, 1960. 5 figs., 3 eqs. French and English summaries p. 87. **DWB**—A difficulty encountered when preparing a flood hydrograph for a particular storm is that of estimating the infiltration capacity. A great number of factors are involved when determining the infiltration capacity of permeable land. An experimental determination of the amount of rain after which runoff begins, makes it possible to reduce the problem to one of estimating the infiltration capacity of a heterogeneous surface and this is much easier. The Porcher method provides a solid basis from which to extrapolate infiltration capacities for heavy precipitation. This makes the forecasting of exceptional floods a much less random procedure. The method, which is applicable to land of medium and very great permeability, should be of much use were there is much vegetational cover or little runoff, conditions which frequently occur in temperate countries. *Subject Headings:* **1. Infiltration capacity 2. Runoff 3. Flood forecasting techniques.**—*Authors' abstract.*

12.10–385 551.509.58(521.75):551.579.4

Furuhashi, S., **On the flood forecasting of Maryuama River in Hyōgo.** *Journal of Meteorological Research*, Tokyo, 12(5):335–339, May 1960. 7 figs., 9 tables, 2 refs. In Japanese. **DWB, DLC**—The author devised a new method for forecasting the flood of Maryuama River (total basin areal: 1316,514 Km²) in Hyōgo prefecture, and obtained a good result when it was used for experimentation. He first found the outflow coefficient from the decreasing water curve and multiplied it by direct rainfall amount, and obtained the computed water range ($\Sigma \bar{R} \cdot \beta$) that corresponds to the flowing amount figure. Then, the resultant value was multiplied by the formula: the unit flow amount outflow rate. This method was particularly useful and successful when it was used for the forecasting of flood which occurs within 24 hours after the start of the rainfall. *Subject Headings:* **1. Flood forecasting 2. Maryuama River, Japan.** —*K.C.*

12.10–386 551.509.58:63

Kulik, M. S., **Agrometeorologicheskie prognozy: vazhneĭshiĭ vid obsluzhivaniia sel'skogo khoziaĭstva.** [Agrometeorological forecasts: the most important factor in the Agricultural service.] *Meteorologiia i Gidrologiia*, Moscow, No. 6:3–8, June 1960. **DWB, DLC**—General technical progress and specific increase of agriculture production is connected with the special study of the meteorological conditions favorable for certain types of agriculture products grown at specific regions. Activities of various agrometeorological organizations of local and regional character are described in detail in relation to accumulation, preservation and distribution of moisture on ground surface (rainfall, snow cover and river floods). The methods of prevention of drought, frost, sukhovei (arid) and other climatic disadvantages are also discussed. The study and development of agrometeorological forecasting are made on the basis of the agro-climatic data obtained in different regions with various representative characteristics.

Fourteen types of specific agrometeorological forecasts were developed as the basis for detailed work of the Central Institute of Forecasting, Weather Bureau and Hydrometeorological Bureaus. Five major considerations are included in the description of these forecasts. Expansion of specific services in various regions is outlined for different types of agriculture products (corn, sugar beets, vegetable, grain, etc.). Special attention is given to the consideration of the micro-climatic conditions and their effects on the agrotechnical methods and on improvement in quality and growth of different products. *Subject Headings:* **1. Agrometeorological forecasting 2. Microclimatological conditions 3. U.S.S.R.**—*N.P.S.*

12.10–387 551.509.58:551.513.1:551.579.4:551.482.2(282.247

Ogievskaia, V. A., **Primenenie pokazateleĭ atmosfernoĭ tsirkuliatsii dlia prognozo naivysshikh urovneĭ v zimnevesenniĭ period na rekakh Zakarpatskoĭ oblasti.** [Use of atmospheric circulation indices in forecasting the highest winter and spring water levels in Transcarpathian rivers.] *Kiev, Ukraine. Nauchno-Issledovatel'skiĭ Gidrometeorologicheskiĭ Institut, Trudy*, No. 15:73–83, **1958.** 3 figs., 6 tables, 1 ref., eqs. **DLC**—The method of L. A. VITEL'S for forecasting river runoff on the basis of pressure anomalies is applied to long-range forecasting of maximum flood levels on the Tisza, Vilok, Rika, etc., rivers in the Transcarpathian region. It was found possible to distinguish 22 forecasting indicators for the period March–Dec. of the preceding year. Forecasting indices for the maximum mean daily levels and levels at fixed dates on the Terra and Delovoe Rivers, graphs showing the relationship of maximum levels for various periods to forecasting indicators and curves of probabilities of errors etc. are presented. The proposed forecasting method is evaluated. *Subject Headings* **1. Runoff forecasting 2. Flood forecasting 3. Atmospheric circulation indices 4. Transcarpathian rivers, Ukrainian S.S.R.**—*I.L.D.*

12.10–388 551.509.58:551.579:621.311.1

Popov, E. G. and Parshin, V. N., **Ob effektivnosti prognozov pritoka vody k gidroelektrostantsiiam.** [The effectiveness of forecasting the water intake at hydroelectric power stations.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:18–23, Jan. **1960.** 4 tables, eq. **DWB, DLC**—The authors investigate the effectiveness of the utilization of forecasts of influx of water into hydroelectric power stations. Data on the verification of seasonal, quarterly and monthly forecasts of water influx into 30 of the largest hydroelectric stations of the U.S.S.R. for the period 1954–1958 (more than 2000 forecasts) were used. The effectiveness of forecasts of water influx is determined by three principal factors, namely accuracy of the forecasts, the length of time in advance they are issued and the advantage which their use gives in operation. The statistical effectiveness of forecasts is characterized by several numerical indices, the most simple of which is the excess of the expectation of the permissible errors of forecasts of influx over the expectation of such a deviation from the constant value, which is utilized in the absence of forecasts, for example from influx values 75 or 50 percent of expectation: $\Delta p = p - \bar{p}_k$, where p = expectation of permissible forecast errors, ($\pm 20\%$) and $\bar{p}_k$ = expectation of such deviation from the constant influx. Data are presented on the values of the index of effectiveness of forecasts Δp (in %) relative to influx of 75 and 50 percent expectation for different values of the coefficient of variation and mean square errors, excess of expectation of error of forecasts of influx (p_f) within ± 20 of the actual values over expectation of such a deviation from the inflow of 50 and 75 percent expectation, the distribution of forecast errors of spring water influx into water reservoirs during 1954–1958 and deviations from the influx of 50 and 75 percent expectation, etc. The values of Δp for mean square errors of 15–20 indicate that the use of influx forecasts for planning energy production always yields gains in comparison with planning according to discharge of a given expectation, since the coefficient of variation of monthly, quarterly and seasonal influx is usually 0.3–0.6. *Subject Headings:* **1. Flood forecasting 2. Hydroelectric power stations 3. Hydrological forecasting 4. U.S.S.R.**—*I.L.D.*

12.10–389 551.509.58:551.579.4:551.326.8:06

Rakhmanov, V. V., **Nauchnaia konferentsiia po problemam prognozov vod sushi.** [Scientific Conference on Problems of Forecasting Continental Waters.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:63–64, Jan. **1960. DWB, DLC**—At the scientific conference of applied hydrology held in Moscow during Oct. 13–21, 1959 two principal problems were considered

namely: forecasting spring river floods and forecasting ice phenomena on rivers, lakes and water reservoirs. Among the various papers mentioned is that of M. A. VELIKANOV on the analysis of forecasting theory: he proposed the use of the method of minimum modules and the associated median and asymmetric distribution in forecasting. The conference pointed out the present inadequacies in the laws of spring runoff formation, in forecasting methods for mountain regions, in knowledge of atmospheric processes during the transitional seasons etc. The conference examined a new project dealing with objective criteria of evaluating methods of forecasting and verification of forecasts on the basis of mathematical statistics (E. G. POPOV and V. N. PARSHIN). The various resolutions of the conference are summarized. *Subject Headings:* **1. Hydrological forecasting 2. Conference on Problems of Forecasting Continental Waters, Moscow, 1959.**—*I.L.D.*

12.10–390 551.509.58:551.579.4:551.482.2(282.247)

Vazhnov, A. N., **K metodike prognozov lene-osennego stoka na rekakh Zakavkaz'ia.** [Method of forecasting the summer-autumn discharge of Transcaucasian rivers.] *Moscow. Tsentral'nyĭ Institut Prognozov, Trudy*, No. 96:56–75, **1960.** 9 figs., 9 tables, 2 refs., 3 eqs. **DWB, DLC**—Forecasting of monthly and quarterly discharges for the period July–Sept. are most difficult and at the same time important problems of hydrological forecastings. The basic difficulty is the character of the alimentation of rivers in this period. It is known that the summer discharge of Transcaucasian rivers is composed of: underground alimentation that depends on precipitation and snow thawing in the preceding period; thawing snow in the upper reaches of the mountains that still remains there at the beginning of summer period. It is evident that the success of forecasting will depend on the relation of alimentation by underground waters and other two sources. The greater is the amount of underground alimentation the more reliable is forecasting. In the majority of the rivers the summer discharge is about 20%–25% of full yearly discharge; for the rivers of high elevated basins this percentage is higher. Tables of the magnitude of summer discharge of several rivers are given, showing the areas of the basins, mean yearly and July–Sept. discharges (the later in percents of full-yearly), and the mean elevation of the basin. Another table given shows the components of the summer discharge. It is evident that for successful forecasting at about one month before the season, one must have the data for computations of expected magnitude of underground alimentation, which, as foregoing table shows, is from 70% to 90% of the full discharge. The method of computing the depletion of underground water reserves is given with formulas and necessary explanations. Practical methods of working out the data for forecasting the magnitude of summer-autumn discharge are described in detail. Derivation of magnitude of seasonal underground alimentation is explained. The examples of data computation for the forecasting are given for several rivers, illustrated by numerous graphs and tables. It is mentioned that the given examples are the ones that were difficult to process The article is concluded by general detailed analyses of given examples and relations between the components of the total summer-autumn discharge and possible variations in those relations. The need of verification by the field observation of many statements and derivation is mentioned. *Subject Headings:* **1. Discharge forecasting 2. Hydrological forecasting 3. Transcaucasian rivers.**—*B.J.G.*

12.10–391 551.509.58:551.579

Velikanov, M. A., **Stokhasticheskaia struktura gidrologicheskogo prognoza i uchet ego oshibok.** [Stochastic structure of a hydrological forecast and estimate of its errors.] *Meteorologiia i Gidrologiia*, Moscow, No. 4:17–24, April **1960.** 2 refs., 18 eqs. **DWB, DLC**—The structure of hydrological forecasts consists of three elements: (1) information on factors which precede in time the expected phenomena and whose characteristics are assumed known at the time the forecast is made; (2) these factors from the date of meteorological forecasts whose occurrence and intensity directly influence the expected forecast; and (3) calculation from the above data (temperature, humidity, thickness of snow cover, etc.) the properties of the predicted phenomena on the basis of theoretical methods. The deviation of the formulas for calculating the dispersion of a forecast value, i.e. the forecast error (when the dispersion of all the values characterizing the elements upon which the phenomenon being forecast depend and the covariance between these values are known) is carried out. With reference to the normal

Gaussian curve, the validity of the normal law is examined for the case of asymmetrical dis tribution, since in hydrological forecasts the deviations are in most cases extremely large. Th evaluation of the ordinary forecasts in which the arithmetic mean is replaced by the media and the normal law by the gamme function is outlined. The mathematical development o these steps and of the determination of the confidence interval of the magnitude that is forecas the latter involving the chi-square test, are presented. The statistical procedures are illustrate by means of two applications involving the forecast of peak discharge of river floods on a hig river and the forecast of the shower hydrograph according to time intervals on the basis o calculation of the data on the variation of a shower during the same interval. *Subject Heading* **1. Hydrological forecasting 2. Shower forecasting 3. Forecast errors.**—*I.L.D.*

Miscellaneous Phenomena (551.509.59)

12.10–392 551.509.59:551.501.81:551.509.324

Noel, Thomas M. and Fleisher, Aaron, **The linear predictability of weather radar signal** Massachusetts Institute of Technology. Dept. of Meteorology. Weather Radar Researc Contract AF 19(604)-5220, Research Report No. 34, June **1960.** 46 p. 31 figs., 2 table 9 refs., 5 eqs. **DWB**—The linear predictability of the plane field of radar signals from weath has been studied. The results are a description of the quality of the forecasts and the dependence on time and location, of the sources of information and of the eddy structure precipitation. *Subject Headings:* **1. Eddy structure of precipitation 2. Radar forecast ai 3. Radar precipitation forecasts.**—*Authors' abstract.*

12.10–393 551.509.59:551.501.81:551.515

Sal'man, E. M., **Nekotorye voprosy uluchsheniia sluzhby radiolokatsionnogo shtorm poveshcheniia.** [Improving certain problems in the radar storm warning service.] *Mosco Tsentral'naia Aerologicheskaia Observatoriia, Trudy*, No. 20, **1958.** p. 26–35. 5 figs., tab 8 refs., 14 eqs. **DWB**—The present net of radar stations, established for the safety of aviatio is quite capable of furnishing reliable information relative to the location, speed and directi of movement and, sometimes, the tendency of further developments of the centers of precipit tion. However, up to now, it was impossible to separate showers and thunderstorms in warning. The dangers to aviation are not the same. Consequently, further development the radar warning system should be directed toward the establishment of reliable crite permitting the separation of radar images of showers and thunderstorms. The peculiarities the vertical structures of thunderstorm and shower radio echo are discussed and illustrate This is followed by a discussion of the reliability of different structural characteristics of show and thunderstorms, based on mathematical analysis. In conclusion the evaluation of t intensity of showers by radar is analyzed. Graphs of maximum distances at which show can be detected and two graphs of intensities are used for illustration. *Subject Headin* **1. Radar storm detection networks 2. Storm forecasting.**—*B.J.G.*

MISCELLANEOUS (551.509.8/9)

12.10–394 551.5:398.2:840 551.50

Dufour, L., **Quelques remarques sur les relations entre la littérature et le folklore mé orologique.** [Some remarks on the relationship between literature and meteorological fo lore.] *Ciel et Terre*, Brussels, 76(7/8):221–225, July/Aug. **1960. DWB, DLC**—In this arti the author presents a list of popular meteorological beliefs which he has encountered in literature. In French literature there is little room for meteorological folklore as popu meteorology does not hold a great deal of the writers' attention. Authors refer very little meteorological folklore of celestial bodies and meteors, maxims on animals and birds behav as weather indications are rarely mentioned, those relating to thunderstorms are less r but the influence of weather on men is more often dealt with. In literature, popular bel are generally expressed by simpleminded persons. Popular meteorology being unsuitable create an "atmosphere" probably is one of the reasons why there is so little meteorolog

lklore in the literature. *Subject Headings:* **1. Meteorology in literature 2. Meteorological lklore 3. Weather lore.**—*A. V.*

12.10–395 551.509.9:551.510.42:711.2

Holland, William D.; Hasegawa, Akira; Taylor, James R. et al. (*all, Los Angeles Co. ir Pollution Control Dist.*), **Industrial zoning as a means of controlling area source air pollu-on.** *Air Pollution Control Association, Proceedings*, Vol. 52, 1959. Issued 1960? Paper o. 64 (22 p.) 8 figs., table, 8 refs. **DWB** (M10.42 A298ap)—Interest in clean air has directed ttention toward metropolitan-wide zoning as a supplementary and preventive measure for ontrol of community air pollution. A discussion is presented of the zoning process in relation-hip to the control of air polluting substances that are not fully susceptible to abatement at the ource. Depending on the sufficiency of supporting data, zoning would permit, limit, or rohibit industrial growth affecting broad areas. Zoning for the reduction of air pollution hould be on a metropolitan basis and be superimposed on the local industrial zoning plans of he governmental sub-units within the area. Metropolitan industrial zoning should be justified y an objective criterion of dilution capacity. The dilution capacity depends on the wind ow, turbulence and vertical mixing and is expected to vary with area and time. To maximize he use of the limited dilution capacity—source density, timed release of contaminants and pecifications of raw materials or processes can be regulated by zoning. Research is needed on he following phases of the industrial zoning program: (1) the pattern of natural dilution apacity, (2) the determination of community air standards, (3) the forecasting of the location f future source emissions, (4) the classification of industries for air pollution potentials, and 5) the adequacy of coverage of air monitoring stations. The discussion proposes to show how n air zoning experiment, while still in the gestation stage, might be useful to plan and zone nture metropolitan areas not yet committed to the patterns of past growth. This case study n Los Angeles County indicates the possible pitfalls and the needed informational activity to listify zoning as a supplementary aid to the air pollution control program. *Subject Headings:* **. Atmospheric pollution control 2. Industrial zoning programs 3. Los Angeles County, Calif.** . **Kauper, Erwin K.**—*Authors' abstract.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

ATMOSPHERIC DENSITY AND COMPOSITION (551.510.3/4)

See: **Atmosphere** (Beliakov), 12.10–31; **Radiocarbon dating** (Lorthioir), 12.10–117; **Determination of spatial density, etc. of micrometeorites at high altitudes** (Bohn, Fuchs), 12.10–164; **Oxidant episodes, San Diego County** (Bell), 12.10–296.

ATMOSPHERIC POLLUTION (551.510.42)

See: **Relationship between eye irritation in synthetic systems and in atmos.** (Renzetti), 12.10–104; **Industrial zoning to control air pollution** (Holland et al.), 12.10–395.

TROPOSPHERE—TROPOPAUSE (551.510.52/528)

See: **Laminar structure of atmos.** (Danielsen), 12.10–19; **Upper air wind obs., McMurdo Sound** (Kangos), 12.10–45; **Scattering of elec. waves in turbulent atmosphere** (Eckart), 12.10–135; **Mid-tropospheric development** (Cressman), 12.10–266.

UPPER ATMOSPHERE—IONOSPHERE (551.510.53/535)

See: **Drifts and irregularities in ionos.** (Mirkotan et al., *ed.*), 12.10–1; **Space research: Proceedings of First Symposium, Nice, 1960** (Bijl, *ed.*), 12.10–3; **Use of missiles to evaluate the concentration of radioactive aerosols at high altitude** (Boclet et al.), 12.10–114; **Determination of spatial density, etc. of micrometeorites at high altitudes** (Bohn, Fuchs), 12.10–164; **Ionos. magnetic fields** (Forbush, Vestine), 12.10–182.

RADIO METEOROLOGY (551.510.62)

See: **Items** 12.10–131 to 12.10–137; **High frequency radio wave black-outs** (Collins et al.), 12.10–149.

RADIOACTIVITY (551.510.7)

See: **Items** 12.10–113 to 12.10–116; **Items** 12.10–119 to 12.10–121.

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE (551.511)

See: **Laminar structure of atmos.** (Danielsen), 12.10–19; **Scattering of elec. waves in turbulent atmos.** (Eckart), 12.10–135; **Equations for short range forecasting and quasi-geostrophic correlations** (Kibel'), 12.10–253; **Mid-tropospheric development** (Cressman), 12.10–266; **Time and space averaging of Rossby waves** (Pichler), 12.10–291; **Synoptic conditions for transport of sea air during winter, S. Far East** (Trostnikov), 12.10–331; **Forecasting geopotential of N. Hemisphere** (Belousov), 12.10–349; **Boundary values of geopotential** (Romov), 12.10–352; **Long range forecasting** (Eliassen), 12.10–357; **Long range forecasting for absolute topography charts** (Keĭferts, Shishkova), 12.10–359.

GENERAL CIRCULATION (551.513)

See: **Weather and circulation, Jan. 1959, U. S.** (Stark), 12.10–248; **On the mechanism of 10-day period in atmos. disturbance** (Kobayashi), 12.10–259; **Secondary circulation, S. Hemisphere** (Serra), 12.10–263; **Mid-tropospheric development** (Cressman), 12.10–266; **Numerical prediction and general circulation** (Charney), 12.10–271; **Conservation of vorticity at 100 mb** (Probert-Jones), 12.10–292; **Long range forecasting** (Eliassen), 12.10–357; **Long range forecasting for absolute topography charts** (Keĭferts, Shishkova), 12.10–359; **Atmos. circulation indices in forecasting water levels, Carpathian rivers** (Ogievskaia), 12.10–387.

ATMOSPHERIC DISTURBANCES (551.515)

See: **Thunderstorms** (Kolobkov, Mezentsev), 12.10–32; **Unusual phenomena in atmos.** (Mezentsev), 12.10–33; **Destruction of trees by tornadoes** (Rossman), 12.10–100; **Refraction of radio waves in air masses** (Bean et al.), 12.10–131; **Formation of warm high** (Hashimoto), 12.10–245; **Movement and deformation of disturbance** (Rikitake), 12.10–247; **Frontal contour analysis of a "polar" low** (Harley), 12.10–252; **Incursion of southern cyclones, Kamchatka** (Agarkova), 12.10–254; **Objective methods of forecasting thunderstorms, Truax Field** (Ardis), 12.10–255; **Frontal waves in S. Ukraine** (Dzivakovskaia), 12.10–257; **Advance of season in view of planetary wave** (Fujita), 12.10–258; **Snowstorms in connection with southern cyclones, Ukraine** (Levdikova), 12.10–261; **Use of temp. fields for forecasting cyclone and anticyclone displacements** (Ponomarenko), 12.10–262; **Secondary circulation, S. Hemisphere** (Serra), 12.10–263; **Numerical prediction of hurricane movement** (Birchfield), 12.10–269; **Tracking hurricane "Audrey" by num. prediction** (Jones), 12.10–275; **Study of mesoscale disturbances by numerical methods** (Sasaki), 12.10–280; **Moving-coordinate prediction of east coast cycles** (Ostby, Veigas), 12.10–283; **Forecasting heavy snowstorms associated with major cyclones** (Bailey), 12.10–284; **Three-front model, developing depression and occluding process** (Galloway), 12.10–287; **Upper trough, Japan** (Ōta), 12.10–290; **Planetary upper frontal zone over E. Asia** (Dziuba), 12.10–304; **Synoptic study on gust wind storm, E. China Sea and N. Kyushu District, Jan. 21, 1958** (Kinoshita), 12.10–312; **Synoptic conditions for northern intrusions, S. E. Kazakhstan** (Shchukina, Kuvaldina), 12.10–326; **Synoptic conditions of Indian sector of Antarctica** (Tauber), 12.10–329; **Forecasting gust wind storms, E. China Sea** (Kinoshita), 12.10–332; **Prognostic significance of altocumulus castellatus and floccus** (Doberitz), 12.10–336; **Precip. amount due to cold front** (Yasuda), 12.10–342; **Thunderstorm occurrence, E. Virginia** (Cox), 12.10–347; **Met. elements distribution in typhoon region** (Tomitaka), 12.10–348; **Storm surge forecasts, German North Sea Coast** (Tomczak), 12.10–353; **Typhoons "Freda" and "Emma," N. Pacific** (Charlton), 12.10–381; **Use of streamlines and vertical cross sections for typhoon analysis and forecasting,** 12.10–382; **Verification of JNWP-Unit hurricane and typhoon forecasts, 1959** (Vanderman), 12.10–383; **Improving radar storm warning service** (Sal'man), 12.10–393.

RADIATION AND TEMPERATURE

RADIATION (551.521)

See: **Infrared radiation** (Hackforth), 12.10–11; **Solar energy resources** (Meliia), 12.10–17; **Radiation and heat balance, E. Antarctica** (Rusin), 12.10–41; **Orbital variations of satellites and radiation belts** (Bartels), 12.10–75; **Ultraviolet satellite spectroscopy** (Aller), 12.10–82; **Satellite obs. of infrared radiation** (Wexler), 12.10–83; **Microclimat. measurements in spruce groves** (Prignon), 12.10–99; **The Sun and its energy** (Marchal), 12.10–123; **Ultraviolet spectrum of Sun** (Purcell et al.), 12.10–144; **Profile of solar Lyman alpha** (Purcell, Tousey), 12.10–145; **Solar ultraviolet spectroscopy** (Rense), 12.10–147; **Lyman alpha photographs of Sun's disk** (Purcell, Tousey), 12.10–148; **Particle fluxes in and near auroras** (Davis et al.), 12.10–197.

TEMPERATURE (551.524)

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SOIL TEMPERATURE (551.525)

See: **Temp. of irrigated soil** (Pletser), 12.10–223; **Ground frost in July, E. Germany** (Runge), 12.10–325.

WATER TEMPERATURE (551.526)

See: **Statistical evidence indicating no climatic change in N. and S. Pacific** (Robinson), 12.10–212; **Role of Aleutian low in formation of ice, Chuckchee Sea** (Kuznetsov), 12.10–315.

PRESSURE AND WIND

PRESSURE (551.54)

See: **Slope of spacial axis of pressure systems** (Burtsev), 12.10–265; **Pressure and wind fields in barotropic atmos.** (Dobryshman, Nozadze), 12.10–272; **Statistical hemispherical predictions** (Mulkern, Cooley), 12.10–289; **Pressure fields over Gulf of Tatary** (Aksarina), 12.10–293; **Forecasting snow limit based on 700–1000 mb thickness, S. Tohoku District** (Yamashita), 12.10–341; **Initial data from two terms in forecasting pressure field** (Diubiuk), 12.10–350.

WIND AND TURBULENCE (551.551)

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PART II. SELECTIVE ANNOTATED BIBLIOGRAPHY ON PLANETARY ATMOSPHERES
2. MERCURY, VENUS AND MARS

By: Andrew J. Meglis and Geza Thuronyi

INTRODUCTORY NOTE

This is the second part of a bibliography on planetary atmospheres, which is being published in three consecutive issues of *MGA*. The first part (in the Sept. 1961 issue) contained material on planetary atmospheres in general and on the Earth. This second part deals with the planets Mercury, Venus and Mars, while the third part will cover the Jovian planets and the Moon.

The material in this second compilation is arranged in four sections: **General** (dealing with two, or all three, planets), *items* 12J–1 to –13; **Mercury,** 12J–14 to –19; **Venus,** 12J–20 to –75 and **Mars,** 12J–76 to –216. A few supplementary items have been appended after the fourth section.

Again it must be made clear that this bibliography does not represent an attempt at complete coverage, but it is hoped that it contains references to many of the important studies on planetary atmospheres.

Our thanks are due to R. Baker of the British Meteorological Office, S. L. Hess of Florida State Univ., L. D. Kaplan of Massachusetts Institute of Technology, G. P. Kuiper of the Univ. of California, D. W. McLeod and J. W. Salisbury of the U. S. Air Force Cambridge Research Laboratories, J. Vandenplas of the Institut Royal Météorologique, Belgium and others for valuable suggestions related to material selection.

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GENERAL

1911

12J–1 523.4:551.510.41

Arrhenius, Svante August, **Les atmosphères des planètes.** [Atmospheres of the planets.] Paris, Librairie Scientifique A. Hermann et fils, **1911.** 11 p. 6 figs. (incl. photos). (Publications de la Société de Chimie Physique.) **DWB** (M 0405 A774 A)—The outer planets are assumed to be gaseous and, therefore, lacking in atmosphere in the usual sense of the word. Among the planets having a solid crust, Mercury has no atmosphere. The atmospheres of the three remaining planets—Venus, the Earth and Mars—and their probable past and future evolution are described in general terms. It is assumed that the planets must have had the same composition as the outer portion of the sun. An attempt is made to outline the physical and chemical processes which led from this original state to the present composition of the Earth and its atmosphere. Mars is pictured as a cold desert with a thin atmosphere, an image of what the Earth will be like in its age of decline, several billion years hence. The atmosphere of Venus is found to be extremely transparent. This and the presence of clouds explains the planet's high albedo. *Subject Headings:* **1. Planetary atmospheres 2. Atmospheric composition.**—*G.T.*

1918

12J–2 52(02) 551.510:523.4

Arrhenius, Svante August, **Destinies of the stars.** Authorized transl. from the Swedish by J. E. Fries. N. Y., Putnam, **1918.** 256 p. 27 figs. (some fold.). **DWB** (M90.2 A774d)—Meteorological and geoastrophysical problems are treated in the chapters on atmosphere and physics of the stellar bodies; the chemistry of the atmosphere and the planets Mars and Mercury, the moon and Venus are covered in the second half of this classical work. The historical value of its statements remains timeless even when outdated by the rapid evolution of science in the exploration and research of its subjects, including from the first half of the book the chapter on the Milky Way. The impossibility of an atmosphere on the moon, troposphere and stratosphere, hydrogen, water vapor and carbonic acid in the composition of the atmosphere, atmospheric modification and the problems of Mars are some topics included in this valuable work. *Subject Headings:* **1. Astronomy textbooks 2. Planetary atmospheres.**—*O.T.*

1952

12J–3 523.4:577.4

Sharonov, Vsevolod Vasil'evich, **Est' li zhizn' na planetakh?** [Is there life on the planets?] Moscow, Voennoe Izdatel'stvo Voennogo Ministerstva Soiuza SSR. **1952.** 45 p. 14 figs., foot-refs. (*Nauchno-Populiarnaia Biblioteka Soldata.*) **DLC** (QB54.S48)—Physical conditions for producing life are described, and the possibilities of life on the Moon, Venus and particularly on Mars, are discussed. *Subject Heading:* **1. Life on planets.**—*S. Nowinska.*

1955–1959

12J–4 523.4:5

Tikhov, G. A., **Osnovnye problemy i perspektivy astrobotaniki.** [Basic problems and prospec of astrobotany.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy,* 4:7–27, 195 3 foot-refs. **DLC** (QK1 A35866)—Past and present activities of the Section of Astrobotany, Ac demy of Sciences, Kazakh, S.S.R., are outlined. This work is centered around the observation optical characteristics of plants by means of spectroscopy. The author also discusses the gene problem of life in the solar system in the light of existing knowledge of physical conditions on t various planets. He concludes that microorganisms must be present on Mars and Venus. further suggests that methane in the atmosphere of giant planets may be produced by bacteria. the presence of molecular oxygen they are capable of transforming carbon dioxide into methane, and can be assumed with certainty that there is oxygen in the atmospheres of the giant planets. *Subj Headings:* **1. Life on planets 2. Astrobotany.**—*G.T.*

12J–5 551.510:523.4

Strong, John, **New facts on planetary atmospheres.** *International Union of Geodesy a Geophysics. Association of Meteorology, Rome, Sept.* 1954, *Scientific Proceedings.* London, Butt worth, **1956.** p. 566–568. fig., table. **DWB**—The author summarizes the results of a three su mers' study of the atmospheres of Mars and Venus. These include observations of the spec from 7–14μ (given in a table and graph) and distributions of the apparent temperatures over t surfaces of these planets. Also drift curves across the disk of Venus and Mars are discussed. *Subj Headings:* **1. Planetary atmospheres 2. Mars 3. Venus.**—*I.L.D.*

12J–6 551.510:52

King, J. I. F. (*General Electric Co., Phila., Pa.*), **Probing the atmospheres of Venus and Ma** *Franklin Institute, Phila., Journal . . . Monograph,* No. 6:150–160, Dec. **1958.** 7 figs. **DW** (629.1388 F832te)—This discussion is based on modified terrestrial results appropriate to celes bodies, and apparently inspired by Chandrasekhar and his mathematical solution of the more comp solar problem. The analysis of the Martian and the Venus disk involves some data from rec literature (KUIPER, UREY, SINTON, DE VAUCOULEURS). The convective layer of the Martian atm sphere, height of which is 4 km, considered in relation to the yellow dust clouds may perhaps be du dust storms similar to those on the earth, and the upper violet haze layers due to free radicals from sun's ultraviolet radiation. The Venus limb darkening of about a factor of 10 indicates a non-g atmosphere. The scan of intensity across a planetary disk enables determination of: 1) the amo of grayness; 2) the line structure of the atmosphere; 3) thickness of the atmosphere; and 4) temperature. Limb darkening as applied to terrestrial atmosphere may be obtained by space-b instruments and may reveal valuable information. *Subject Headings:* **1. Venus 2. Martian mosphere 3. Planetary atmospheres.**—*W.N.*

12J–7 551.58:523.4

†Richardson, Robert S. (*Mt. Wilson and Palomar Obs.*), **A survey of conditions on Mars Venus.** *Navigation,* Los Angeles, 6(1):43–46, Spring **1958.** 2 photos, 26 refs. **DLC**—The Mar climate and possible crustose-lichen plant life on Mars are discussed. A cold, high-altitude ty climate exists on Mars. Temperature at subpolar point is 10°C and at the limb −13°C. Radia cannot be measured directly but has been estimated at −100°C. Venus radiation occurs at −4 and it has not been possible to detect lines of water vapor nor of oxygen but surrounding Venus cloud layer which consists of H_2O. The author describes his radio observations of Venus (Febr to July, 1956), as well as its rotation. The result of rotation showed an equatorial velocit −0.032 km/sec, with a mean standard error of ±0.033 km/sec. (*Same item as* 11.5–109, *Met. A Subject Headings:* **1. Martian meteorology 2. Planetary climates 3. Venus.**—*N.N.*

12J–8 551.510:523.5

de Vaucouleurs, Gérard (*Harvard College Obs., Mass.*), **Remarks on Mars and Venus.** *Jou of Geophysical Research,* Wash., D. C., 64(11):1739–1744, Nov. **1959.** 6 figs., 4 tables. **DLC**— study provides astronomical, astrophysical and geophysical information on the planets Mars Venus. The astronomical data on these planets are rather complete, however, the rotation pe of Venus and the ellipticity of Mars have not yet been determined. The author expects that arti satellites will contribute to the solution of these problems. As far as the astrophysical data concerned, the composition of the atmosphere shows that on Mars the bulk of the atmosphe nitrogen; on Venus the evidence of carbon dioxide absorption bands indicate the existence of than 1 km of carbon dioxide. The temperatures of the terrestrial planets are shown in a t The big discrepancy of temperature values on Venus may be caused by a very strong greenh

effect. The clouds covering the surface of Venus are probably droplets of water as on earth. KOZYREV and NEWKIRK took spectra of the dark side of Venus and identified a number of emission features. The infrared spectra of Mars, made by W. M. SINTON of Lowell Observatory, suggest the presence of organic molecules. This observation is very close to offering a final proof of the existence of plant life on Mars. *Subject Headings:* **1. Planetary atmospheres 2. Mars 3. Venus.**—*E.K.* Ⓢ

12J–9 551.510:523.4

Urey, H., **Pervonachal'nye atmosfery planet.** [Initial planetary atmospheres.] *Priroda*, Moscow, No. 4:33–38, April **1959.** eq. **DLC**—This report on the origin of planetary atmospheres was presented by HAROLD C. UREY (well known American physicist), at the International Symposium on the Origin of Life on the Earth in August 1957 in the U.S.S.R. The history of the atmosphere of the earth and of the planets Venus and Mars is discussed. It is concluded that large quantities of water had probably occurred on the surface of all three planets and that the existing high temperatures were no obstacle for the development and the sustaining of life on these planets. (*Same item as* 11.11–37, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Atmospheric evolution.** —*A.M.P.*

1960

12J–10 523.42/3:577.4

Dollfus, Audouin (*Observ. Paris, Meudon, France*), **Recherches concernant la vie sur les planètes.** [Research on life on the planets.] *International Space Science Symposium, 1st, Nice, Jan.* 1960, *Space Research: Proceedings.* Pub. **1960.** p. 1146–1152. French, English and Russian summaries p. 1146. **DWB** (523.1 161sp)—1. Observations indicating life on Mars. The dark patches on the ground polarize light in the same manner as a deposit of opaque grains. The polarization varies seasonally and is observed at the same time when the contrast changes are observed by the telescope, at the moment when the content of water vapor is increased in the air. It is therefore assumed, that small organisms, capable of blooming in the spring, are present on the ground. 2. A study of the atmosphere of Venus. The conditions of life depend on the presence of water in the atmosphere. The water vapor observations are made by means of spectroscopes, carried into the stratosphere by balloons. The device consists of a metallic cabin surmounted by a telescope of 50 cm diameter and of a spectrophotometer, which gives the intensity of the 1.4 microns water vapor band from Venus and from the Moon. The cabin and the observer are carried into the atmosphere by a group of 100 big sounding balloons, which are attached to a cable. In France, the author has already made an ascent which lasted for five hours. *Subject Headings:* **1. Life on planets 2. Mars 3. Venus.**—*Author's abstract.* Ⓢ

12J–11 523.42/3:551.510

Harvard Univ. Harvard College Observatory, **Research directed to the study of planetary atmospheres.** Contract AF 19(604)-3074, Final Report, Oct. 10, **1960.** 12 p. **DWB**—Several planetary investigations were carried out during the 2½ years of this contract. Regional and integrated photometry of Mars has been done and the results published in Scientific Reports Nos. 4 and 5. The occultation of Regulus by Venus on July 7, 1959, was observed and information obtained on the scale height and its variation in the planet's atmosphere, and corrections to the ephemeris position of the planet were derived; the results will soon be published. Two heat detectors were studied with regard to obtaining pictures of the temperature distribution over the lunar surface; special instruments were constructed for observing the occultation of Regulus; and improved techniques of composite printing of planetary photographs were developed. Studies of the possibilities of conducting high resolution photography from a balloon-borne telescope were made and published in SR No. 1, and some related investigations (unpublished) were also carried out. Finally, an extensive program for obtaining accurate coordinates of surface features on Mars has been undertaken, based in part on composites made from the best available negatives taken at Mt. Wilson and Johannesburg. Some observations have already been published in SR No. 2, and more will be published shortly; this work is continuing under the successor contract, AF 19(604)-7461. *Subject Headings:* **1. Planetary atmospheres 2. Martian surface features 3. Occultation of Regulus by Venus.**—*Authors' abstract.* Ⓢ

12J–12 523.42/3

Richardson, Robert S. (*Griffith Obs.*), **Observations on Mars and Venus.** *Lunar and Planetary Exploration Colloquium, Oct.* 29, 1958, *Proceedings*, 1(3):19–27, pub. **1960.** 17 plates. **DWB, DLC**—An attempt is made to interpret some phenomena on Mars as shown on photographs, including the region Photh, a W-shaped cloud, the maria as probable vegetation, the canals as probably extensions of the maria, the Martian atmosphere and its clearing, the evidence of atmospheric oxygen and water

vapor, the problem of plant life as approached by an experiment of photographs in deep red a infrared, the orientation of the axis of Venus, its rotation period, the problem of oxygen or wa vapor in the atmosphere. The discussion dealt with some of the suggested theories on differ problems. *Subject Headings:* **1. Mars 2. Venus.**—*O.T.* Ⓢ

12J–13 551.507.362:523.42/3:536

Rutowski, R. W. and Chan, K. K. (*both, Lockheed Missiles and Space Div., Palo Alto, Cali* **Shock tube experiments simulating entry into planetary atmospheres.** *Advances in the Astronaut Sciences*, N. Y., Vol. 5, issued **1960.** p. 346–356. 7 figs., 2 tables, 4 refs., 32 eqs. **DWB** (629.1. A512pro), **DLC** (QB1.A26)—Theoretical estimates of heating rates which would be experien by a vehicle entering the atmospheres of Mars and Venus have been made by others. This pa reports preliminary results of stagnation-point heat-transfer rates measured in hypervelocity fl of gas mixtures simulating these atmospheres. These measured rates are used to infer heating ra that vehicles would be expected to experience actually during a ballistic entry. Present indicati are that entry heating rates for Venus may be as much as 50% higher than terrestrial re-entry ra Mars entry heating rates are only a few percent of those for Venus or for the Earth. *Subject He ings:* **1. Space ships 2. Re-entry into atmosphere 3. Planetary atmospheres.**—*Authors' abstrac*

MERCURY

1934

12J–14 52

Antoniadi, Eugène Michel, **La planète Mercure et la rotation des satellites.** [Planet Mer and the rotation of satellites.] Paris, Gauthier-Villars, **1934.** 76 p. 36 figs., 3 plates, tables, **DLC** (QB611.A5)—Following the chapters on generalities, on Mercury's passage in front of the and on its geography and rotation, the last two chapters are devoted to its atmosphere and its phy conditions, based on the results obtained by the telescope of Meudon Observatory. Its alb among the most faint of the solar system, indicates a surface composition similar to that of the m While phase effects and polarization are also similar to the moon's, its spectra is identical with of the sun. The low-density atmosphere might extend to an altitude of 16,000 m. The faint very volatile clouds are composed of extremely fine dust rather than of liquid droplets or ice nee Mercury receives four to ten times as much solar radiation than the earth. Mt. Wilson obse 227 to 437°C temperatures with a thermocouple. The atmospheric pressure is very low. temperature differences between the solar and dark hemisphere cause vigorous winds with n changes, stronger at perihelion than at aphelion lifting probably dust whirlwinds. The tempera differences cause a desert surface. A form of life is not entirely excluded despite the impossib of vegetation and animal life. The rare atmosphere permits an exceedingly clear observation o planet Mercury. The monotony of its eternal night is very often interrupted by magnifice servations of polar aurora, particularly brilliant at sunspots. A series of cloud observations Meudon and an imaginative picture of sunrise on Mercury are outstanding among the illustrat A subject index is provided. *Subject Headings:* **1. Mercury 2. Planetary atmospheres.**—*O.T.*

1936

12J–15 5

Pettit, Edison and Nicholson, Seth B., **Radiation from the planet Mercury.** *Astroph Journal*, 83:84–102, **1936.** 4 figs., 4 tables, refs. Reprinted as *Mount Wilson Observatory, Con tion* No. 533. **DLC** (QB611.P45)—The following topics are discussed: method of measure reduction of the measurements, radiation as a function of phase, apparent temperatures, temper of the subsolar point and the radiometric albedo. *Subject Heading:* **1. Mercury.**—*From au abstract.*

1951

12J–16 523.41:53

Rubashev, B. M., **Sledy atmosfery na Merkurii.** [Traces of an atmosphere on Mer *Priroda*, Moscow, 40(11):47–48, **1951.** 10 refs. **DLC**—The physical conditions on Mercury pre ing the existence of an atmosphere are stated, the application of the polarimetric method for stu planetary atmospheres is described and the investigations of A. Dollfus which indicate the exis of traces of an atmosphere on Mercury are discussed in detail. (*Same item as* 4.6–255, *Met. Subject Headings:* **1. Planetary atmospheres 2. Mercury 3. Polarimetry.**—*I.L.D.*

1952

12J–17 551.510.41:523.41

Ringnes, Truls R., **Merkur har atmosfare.** [Mercury has an atmosphere.] *Naturen*, Bergen, 76(4):127, **1952. DLC**—Whether or not Mercury has an atmosphere was never determined until the astronomer A. Dolfuss, through his studies of polarization of Mercury's light at Pic-du-Midi in southern France, gave definite evidence of its existence. If one assumes that Mercury's atmosphere has the same composition as the earth's, its density is but 0.003 of the earth's atmosphere density or a pressure of about 1 mm mercury. The escape velocity at Mercury's surface is 3.6 km/sec. (*Same item as* 4.7–57, *Met. Abs.*) *Subject Headings:* **1. Planetary atmospheres 2. Mercury 3. Pic-du-Midi, France.**—*W.N.*

1961

12J–18 523.64:523.41

Makhover, S. G. and Bokhan, N. A. (*both, Inst. of Theoretical Astronomy, ANSSSR*), **Motion of Comet Encke-Backlund during 1898–1911 and a new determination of the mass of Mercury.** *Soviet Physics: Doklady*, N. Y., 5(5):923–925, March/April **1961.** 3 tables, 6 refs. **DWB.** Transl. of original Russian in *Akademiia Nauk SSSR, Doklady*, 134(3):552–554, Sept. **1960. DLC**—Comet Encke-Backlund approaching Mercury closer than any other celestial body can be used for the determination of the mass of this planet. The difference in its old value of 1:9,700,000 and the present one of 1:600,000 is due to a secular acceleration of the mean motion, and decrease of the eccentricity of the comet, probably due to retarding forces of its nucleus. The perturbations due to other planets could not be taken into account in Backlund's time (1894) with sufficient accuracy. The residual deviations of the normal position for 1908 were too large in Backlund's analysis. Makhover's analysis of the motion during 1937–1954 led to a new value of the mass of Mercury. A new determination based on five appearances of the comet during 1908–1911, improved the orbit elements by recalculation of the perturbations, the results of which are presented in tables. The recent determinations of the mass of Mercury are in good agreement with each other but disagree with Backlund's determination. *Subject Headings:* **1. Mercury 2. Comet Encke-Backlund.**—*O.T.* Ⓢ

12J–19 523.41

Walker, J. C. G. (*Lamont Geological Obs., Palisades, N. Y.*), **The thermal budget of the planet Mercury.** *Astrophysical Journal*, Chicago, 133(1):274–280, Jan. **1961.** 3 figs., 16 refs., 6 eqs. **DWB, DLC**—Assuming that the interior of Mercury is in thermal steady state, that the specific rate of radioactive heat production in the planet is equal to that in chondritic meteorites, and that the thermal conductivity equals 1.33 cal deg^{-1} cm^{-1} min^{-1}, the surface temperatures on Mercury range from 621°K at the subsolar point (at mean distance from the sun) to 28°K at the antisolar point. These temperatures are relatively insensitive to changes in conductivity and rate of heat production. *Subject Heading:* **1. Mercury.**—*Author's abstract.* Ⓢ

VENUS

1897

12J–20 523.42:521.151.3

Flammarion, Camille, **La planète Venus: discussion générale des observations.** [The planet Venus: general discussion of the observations.] Paris, Gauthier-Villars et Fils, **1897.** 32 p. 33 figs., foot-refs. **DLC** (QB621.F6)—Observations of Venus, the latest ones from 1882–1894, are described, and pictures drawn by the observers, sometimes quite different, are reproduced. The transit of Venus across the solar disk on Dec. 6, 1882 is described. The author considers data on Venus not conclusive. The British astronomer Brenner found that Venus rotates in 23^h 57 min. But other astronomers: Tchiapareth, Fay, Terby, Perrotin and Lowell suggested a rotation in 224 days. Maps of Venus made up to 1897 are considered deceptive. *Subject Headings:* **1. Venus transits across the Sun 2. Rotation of Venus.**—*S.N.*

1915

12J–21 523.42:551.510:577.4

Housden, C. E., **Is Venus inhabited?** London, Longmans, Green, **1915.** 39 p. 11 figs. **DWB** (M 0405 H842)—After a discussion of the atmosphere (primarily concerned with water and water vapor of Cytherean atmosphere), the author attempts to account for the observable markings on Venus (from works by Lowell) as indications of possible "higher intelligence" at work on the planet. Essence of hypothesis is that markings are canals or pipes designed to transport water from "cold" hemisphere to the "hot" hemisphere in order to extend the otherwise limited area of habitation on

Venus. Two plates containing 11 figs. illustrate the various meteorological and geophysical cond tions on Venus. *Subject Headings:* **1. Venus atmosphere 2. Life on Venus.**—*A.J.M.*

1940

12J–22 523.42:551.510.41:546.264:551.52

Wildt, Rupert (*Princeton Univ. Obs.*), **Note on the surface temperature of Venus.** *Astrophysic Journal*, Chicago, 91(2):266–268, March **1940.** 5 foot-refs., 2 eqs. **DLC** (QB1.A9)—This artic discusses the emission of CO_2 in the Cytherean atmosphere based on estimates of the amount of C as being equivalent to 200 to 400 m at standard T and P. The effect of CO_2 emission on surfa and atmospheric temperature is also discussed briefly. *Subject Headings:* **1. Venus atmosphe 2. Atmospheric composition of Venus 3. Carbon dioxide in the atmosphere of Venus 4. Tem perature of Venus.**—*A.J.M.*

12J–23 523.42:551.510.41:547.281

Wildt, Rupert (*Princeton Univ. Obs.*), **On the possible existence of formaldehyde in the a mosphere of Venus.** *Astrophysical Journal*, Chicago, 92(2):247–255, Sept. **1940.** table, 14 fo refs. **DLC** (QB1.A9)—Ultraviolet spectrograms of Venus, and of the moon for comparison, we obtained with the long-focus quartz spectrograph (dispersion 21.7 A/mm at λ3300) attached to t 82-inch reflector of the McDonald Observatory, in order to search for the electronic absorpti spectrum of formaldehyde gas, which might be formed in Venus' atmosphere by photochemi synthesis. The spectrograms revealed no sign of absorption by CH_2O, while a mass of this g equivalent to 3 mm-atm, under standard conditions, should have been sufficient for spectrosco identification. The implications of this are discussed. Further, since Venus' atmosphere is n spectroscopically free from water vapor but is obviously filled with clouds, the nature of which h never been settled, it is tentatively suggested that solid polyoxymethylene hydrates constitute clouds shrouding the planet's surface. *Subject Headings:* **1. Venus atmosphere 2. Atmosphe composition of Venus 3. Formaldehyde in the atmosphere of Venus.**—*From author's abstract.*

1942

12J–24 523.42:551.51C

Wildt, Rupert (*Princeton Univ. Obs.*), **On the chemistry of the atmosphere of Venus.** *As physical Journal*, Chicago, 96(2):312–314, Sept. **1942.** table, 3 refs. **DLC** (QB1.A9)—Unpublis data by J. F. WALKER show that the clouds of Venus cannot be composed of solid polyoxymethyl hydrates. Since the clouds cannot consist of water, it is suggested that a small deficiency in aqueous component of the primordial magma of Venus may have prevented the formation of hyd sphere; i.e., all water may have been bound in hydrated minerals. *Subject Headings:* **1. Ve atmosphere 2. Atmospheric composition of Venus.**—*Author's abstract.*

1950

12J–25 52

Rubashev, B. M., **Novye dannye o fizicheskikh usloviiakh na Venere.** [New findings regar physical conditions on Venus.] *Priroda*, Moscow, 39(11):37–38, Nov. **1950.** 7 refs. **DL** Among the big planets of the solar system, Venus is the least explored with the exception of P and possibly of Neptune. The reason is that the atmosphere of Venus is almost opaque for vis rays; attempts to make photographs of the surface of Venus have failed. Only by the use of l filters was the non-uniformity of the cloud cover of Venus revealed. Recent observations by N BARABASHOV and V. I. EZERSKIĬ led to some conclusions about physical conditions on Venus, f which the author of the article considers one as more or less substantiated, namely, that toward end of the day the amount of dust in Venus' atmosphere increases considerably. (*Same ite* 2.8–176, *Met. Abs.*) *Subject Headings:* **1. Venus atmosphere 2. Dust on Venus.**—*C.K.*

1954

12J–26 523.42:521.1

Kuiper, Gerard P. (*Yerkes and McDonald Obs.*), **Determination of the pole of rotation of Ve** *Astrophysical Journal*, Chicago, 120(3):603–605, Nov. **1954.** table, 3 refs. **DLC** (QB1.A Results of photographic observations, carried out in 1950 and 1954, to determine the position of of Venus are presented. The pole of the Venus orbit is at $\alpha = 276°$, $\delta = +66°$, 3° from the pole o ecliptic. The obliqueness of the Venus equator is thus about 32°. The attached table support hypothesis that the bands are formed along parallel circles. This implies a rapid rotation o planet, of no more than a few weeks at most, and definitely not in 225 days. *Subject Head* **1. Venus poles 2. Rotation of Venus.**—*E.K.*

1955

12J-27 523.42:550.38

Houtgast, J. (*Sterrenwacht "Sonnenborgh," Utrecht*), **Indication of a magnetic field of the planet Venus.** *Nature*, London, 175(4459):678–679, April 16, **1955.** fig., 3 refs., eq. **DLC** (Q1.N2)—If Venus had a magnetic field, it would, at inferior conjunction, influence the corpuscular streams from the sun to the earth. A variation should be expected, probably a decrease, of the corpuscular intensity, which could reflect itself in the international daily magnetic character figures. The appearance of the corpuscular streams is rather irregular, and the magnetic character figures are a rather crude measure. Further, the magnetic disturbances on the earth are caused not only by the corpuscular but also by the solar UV or X-ray radiation. In order to detect the influence of Venus, it is necessary to use statistical material as extensive as possible and to look for systematic variations in the averages. From Jan. 1884 to Dec. 1953 there were 44 inferior conjunctions; the author has plotted the relative sunspot number for the year of conjunction against time (from 23 days before to 17 days after conjunction). The result is not conclusive but does indicate provisional substantiation of the original hypothesis, namely, that Venus has a magnetic field. *Subject Headings:* **1. Venus 2. Magnetic field of Venus 3. Corpuscular radiation variations.**—*Author's introduction & A.J.M.*

12J-28 523.42:535.33

Kozyrev, N. A., **O prisutstvii v atmosfere Zemli i drugikh planet neotozhdestvlennoĭ molekuly atmosfery Venery.** [The presence of an unidentified molecule of the atmosphere of Venus in the atmospheres of the Earth and other planets.] *Akademiia Nauk SSSR. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia*, 15:160–168, **1955.** 3 figs., 4 refs., 10 eqs. **DLC**—As a result of photometric measurements in the solar spectrum near the horizon the author identified the bands V_1 and V_2 which he had found earlier in the spectrum of Venus. Intensities of these bands show that the amount of the molecules responsible for them is almost ten times smaller in the terrestrial atmosphere than in the atmosphere of Venus. The bands V_1 and V_2 are also present in the spectrum of the sky at zenith where their intensity reaches its maximum at the solar zenith distance of 85°. It follows that the molecules form a layer located around 9 km above the Earth's surface. Spectra of Vega, taken near the horizon, readily show the bands V_1 and V_2 and confirm their having marked violet edges. The positions of the edges, more accurately determined from these spectra are: $\lambda_1 = 382 \pm 1A\,(V_1)$ and $\lambda_2 = 4109 \pm 1A\,(V_2)$. In the spectra of Mars and Jupiter no trace of the bands V_1 and V_2 could be found. *Subject Headings:* **1. Venus spectra 2. Planetary spectra.**—*Transl. of author's abstract.*

12J-29 523.42:551.510.41

Menzel, Donald H. and Whipple, Fred L. (*both, Harvard College Obs.*), **The case for H_2O clouds on Venus.** *Astronomical Society of the Pacific, San Francisco, Publications*, 67(396):161–168, June **1955.** 17 refs., 8 eqs. **DLC** (QB1.A4)—The authors suggest that Venus is completely covered with water and, therefore, its air would be free from all kinds of dust or nuclei. These oceans could produce H_2O clouds with the general and detailed characteristics observed in the Venusian atmosphere. The authors note that the assumption of H_2O clouds in the atmosphere of Venus more nearly agrees with the observational facts and relevant theory than any other working hypothesis. The H_2O hypothesis eliminates many of the difficult evolutionary problems concerned with the absence of water on a planet so nearly like the earth. *Subject Headings:* **1. Venus atmosphere 2. Clouds on Venus.**—*E.K.*

12J-30 523.42:523.036.51

Pettit, Edison and Nicholson, Seth B. (*both, Mt. Wilson and Palomar Obs.*), **Temperatures on the bright and dark sides of Venus.** *Astronomical Society of the Pacific, San Francisco, Publications*, 67(398):293–303, Oct. **1955.** 5 figs., 5 tables, 10 refs., 11 eqs. **DLC** (QB1.A4)—Details of the measurements and reductions concerning the temperature of Venus are given in this article. The observations were carried out between 1923 and 1928. The temperatures were obtained from radiation measurements made at Mt. Wilson and Palomar Observatories with 100 in. telescope, three different thermocouples were used. The radiometric magnitude of planetary heat, the relation of temperatures on a planet to the amount of measured radiation and the atmospheric transmission are considered. On the night side of Venus the mean temperature was 240°K, from 17 observations; on the daylight side, it was 235°K, from 11 observations. These mean temperatures for the dark and the bright sides, respectively, refer to the top of the high cloud cover of Venus. *Subject Headings:* **1. Temperature of Venus 2. Radiometry of Venus 3. Mt. Wilson, Calif.**—*E.K.*

12J-31 523.42

Richardson, Robert S. (*Mt. Wilson and Palomar Obs.*), **Observations of Venus made at Mt. Wilson in the winter of 1954–55.** *Astronomical Society of the Pacific, San Francisco, Publications,*

67(398):304–314, Oct. **1955.** 2 figs., plate, 5 tables, 7 refs. **DLC** (QB1.A4)—The description o instruments used during the observations is followed by a description of the planet. Drawings o Venus, from study of original photographs taken in ultraviolet light are presented. The orientatio of the pole was derived on the assumption that the three bands in the southern half of the disc o Jan. 24, 1955, were parallel to the equator of the planet. The position of the north pole of Venu and the inclination of the equator to its orbit, obtained by KUIPER and the author, are analyze Finally, the photometry of the disk is treated, figures appended show intensity curves across the dis of Venus taken parallel and perpendicular to the terminator. *Subject Headings:* **1. Venus 2. Astr metric instruments 3. Mt. Wilson, Calif.**—*E.K.*

1956

12J–32 523.42:551.510.41:546.2

Chamberlain, Joseph W. and Kuiper, Gerard P., **Rotational temperature and phase variatio of the carbon dioxide bands of Venus.** *Astrophysical Journal*, Chicago, 124(2):399–405, Sept. 195 5 figs., table, 10 refs., eqs. **DLC**—The CO_2 absorption bands in the spectrum of Venus are discusse in terms of a model atmosphere that is optically thick and scatters radiation isotropically. T rotational temperature thus derived from two bands is 285°±9°K (p.e.). A series of low-dispersio spectra shows a marked change in the strength of CO_2 versus phase angle. This phase effect is al interpreted by the radiative-transfer treatment of scattering and absorption in the atmosphe The approximate theory and observations are in qualitative agreement. *Subject Headings:* **1. Ven atmosphere 2. Atmospheric composition of Venus 3. Carbon dioxide in the atmosphere of Venu** —*Authors' abstract.*

12J–33 523.164.3

Kraus, John D., **Impulsive radio signals from the planet Venus.** *Nature*, London, 178(4523): July 7, **1956.** 3 refs. Also his: **Radio observations of the planet Venus at a wavelength of 11** *Ibid.*, 178(4524):103–104, July 14, **1956.** 2 figs., ref. Also his: **Class II radio signals from Ven at a wavelength of 11 m.** *Ibid.*, 178(4525):159–160, July 21, **1956.** 3 figs., 2 refs. **DWB**—Inte radio signals on 11 m were recorded from Venus on May 23 and 30, 1956 in bursts of 1 sec or le peaks of activity about 90 min. apart. They were possibly due to lightning discharges of intensity t same as or less than terrestrial lightning. (*Same item as* 9A–118, *Met. Abs.*) The second arti describes further records of radio emissions from Venus showing a lobe pattern and superposed pea at intervals of 20–90 min. An 11 day repetition of peaks is also suggested. (*Same item as* 9A–1 *Met. Abs.*) The third article describes a different type (II) of signals from those of the two earl communications above. These signals occur in pulses of about 1 sec duration at intervals of a fi seconds to greater than 1 min for periods of 5–10 min. Some pulses had echoes from the mo (*Same item as* 9A–117, *Met. Abs.*) *Subject Headings:* **1. Venus 2. Planetary noise bursts 3. Ra emission from Venus.**—*C.E.P.B.*

12J–34 523.42:521.151.3:523.164:

Kraus, John D. (*Radio Obs., Ohio State Univ.*), **Rotation period of the planet Venus as determi by radio observations.** *Nature*, London, 178(4535):687–688, Sept. 29, **1956.** 3 refs. **DLC** (Q1.N —The rotation period of the planet has been deduced from observations of wavelength of 11 Periods of peak intensity of 11 m radio signals from Venus during June and July 1956 suggest t the rotation period is slightly less than one day. Neglecting second order effects, the rotation per is given by $24\,[1-\{1/(N+1)\}]$ hours, where N is the number of days in the repetition inter *Subject Headings:* **1. Radio emission from Venus 2. Rotation of Venus.**—*E.K.*

12J–35 523

†Öpik, E. J., **Surface conditions on Venus.** *Irish Astronomical Journal*, Armagh, 4(2):37- June **1956.** 4 tables, 22 refs. **DLC** (QB1.B75)—The absence of water is considered the main ca which prevents life from developing on the surface of Venus. The study is a review of old and n data referring to the surface conditions of Venus, in particular those referring to the nature of Venusian clouds. There is convincing evidence against the watery nature of these clouds, as as against the presence of noticeable amounts of water. The top layer of the Venusian cloud 20 km above the ground level—would consist of fine dust particles in yellow color. The car dioxide content of the atmosphere is estimated between 40–100 percent. The mass of the atmosp above ground level is nearly equal to the terrestrial. A grey temperature of +44°C for the sur of the Venusian clouds appears to be appropriate at present. *Subject Headings:* **1. Venus sur 2. Temperature of Venus 3. Clouds on Venus.**—*E.K.*

12J–36 523.42:551.510.4

Robinson, J. Hedley (*Royal Astron. Soc.*), **Atmosphere of Venus 1956, Spring.** *British Astronomical Association, London, Journal*, 66(7):261–264, July **1956.** 2 figs. **DLC** (QB1.B75)—The elongation of Venus during the spring of 1956 afforded an opportunity of continuous observation under good conditions, and some experiments, using different colored filters, have been carried out by the present writer with a view of establishing, if possible, a more detailed picture of the conditions in the atmosphere of Venus at various levels. The equipment used is noted briefly, and the results of the observations are discussed. *Subject Heading:* **1. Venus atmosphere.**—*Author's introduction & A.J.M.*

1957

12J–37 523.42

†Baum, R. M., **Principal observations of the nocturnal hemisphere of Venus 1643–1900.** *British Astronomical Association, London, Journal*, 67(7):242–250, Aug. **1957.** 49 refs. **DLC** (QB1.B75)—An attempt has been made to describe the principal observations of what might be termed the classical era of Cytherean observation, i.e. the period from the inception of telescopic astronomy up to 1900. The paper lists 7 observations prior to 1800, and 37 observations subsequent to 1800. The author points out that it is apparent the phenomenon was actually seen more times than published accounts lead us to suppose. *Subject Heading:* **1. Venus nocturnal hemisphere.**—*E.K.*

12J–38 523.42:551.510.4

Dollfus, Audouin (*Observatory of Meudon, France*), **Recherches sur l'atmosphère de Venus.** [Research on the atmosphere of Venus.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:141–146, **1957.** 3 figs. (photos). **DLC, DWB** (P S678v)—Results of visual, photometric and polarimetric observations of Venus since 1948 are reported. Visual observations showed pronounced grayish patterns suggesting clouds. The rotation period was found nearly equal to the revolution of the planet. Photography in yellow, blue and ultraviolet light revealed spots moving on the disk corresponding to visual observations. Polarimetric measurements indicated an atmosphere about 12 km deep. The water content in Venus' clouds was estimated 25 times lower than on Earth and the atmospheric pressure 10 times lower. Water is believed to be present on the dark hemisphere in unfrozen state because of the strong convective transfer between the illuminated and the dark hemispheres. The assumption of water abundance is consistent with the slow rotation and the properties of clouds observed visually and photographically with the negative result of spectral research and with the results of polarimetric measurements. *Subject Headings:* **1. Venus atmosphere 2. Clouds on Venus 3. Water on Venus.**—*S. Nowinska.*

12J–39 523.42:778.32

Firsoff, V. A., **Venus through colour filters.** *British Astronomical Association, London, Journal*, 67(2):66–75, March **1957.** 2 figs., table, 9 refs. **DLC** (QB1.B75)—Observations made with color filters in daylight, twilight, and against a dark sky are presented. Over the period March to June 1, 1956, 167 drawings were made under 44 different dates. The results are summarized and illustrated with the reproduced drawings. The special features of Venus, the polar caps, the rotational belts, the red and blue clouds, the meridional system of circulation, the rotation of the planet and the ashen light are discussed. *Subject Headings:* **1. Venus drawings 2. Color filter observations of Venus.**—*E.K.*

12J–40 523.42:551.510.4

†Kuiper, Gerard P. (*Yerkes Obs., Williams Bay, Wis.*), **The atmosphere and the cloud layer of Venus.** (In: **The threshold of space,** ed. by M. Zelikoff. N. Y., Pergamon Press, **1957.** p. 78–86. 2 figs., 20 refs., 4 eqs.) **DLC**—A review of research results available for the atmospheric conditions on Venus. Contrary to earlier assumptions by Lyot it is now fairly certain that "Venus has no open basins of water and that the atmospheric content of water vapor must be very low." The yellowish color of the cloud layer, observed polarization and similar factors point toward the possibility of C_3O_2 clouds. The radiation temperature of the top of the cloud layer is −36°C, the average surface temperature of Venus probably is around 43°C. The paper discusses the sources of information (spectra, photometry and polarization, radiometric observations and radio data) and gives concise interpretations of the results. (*Same item as* 11.10–103, *Met. Abs.*) *Subject Headings:* **1. Venus atmosphere 2. Clouds on Venus.**—*A.A.*

12J–41 523.42

Link, F. (*Inst. of Astronomy. Academy of Sciences, Prague*), **Allongement des cornes de Venus.** [Lengthening of the cusps of Venus.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:148–155, **1957.** 4 figs. (incl. photos), 2 tables, 10 refs., 9 eqs. **DLC, DWB** (P S678v)—E. Schoenberg's

suggestion (1949) that the lengthening of Venus' cusps is due to refracted light weakened by d persion is analyzed. In the case of refraction the refracted image of the Sun should have be observed. Because such an image does not appear at the closing of the luminous annulus arou Venus, the lengthening of the cusps is due to diffusion and not to refraction of light. *Subject Headi* **1. Venus cusps.**—*S. Nowinska.*

12J–42 523.

Link, F. and Neužil, L. (*both, Inst. of Astronomy, Czech. Academy of Sciences, Ondrejov*), **Sur couleur de Venus.** [The color of Venus.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 18:156–159, **1957.** 4 refs., eq. **DLC, DWB** (P S678v)—New measurements by the writers co firmed that Venus is more yellow than the Sun in spite of a different opinion by D. H. Menzel a F. L. Whipple (*see* 12J–29, this bibliog.). By assuming the diameter of the water droplets in t upper clouds of Venus to be of several microns, the scattered light should be neutral like in terrestr clouds. The suggestion of water abundance on Venus should not, however, be based on this assum tion only. *Subject Headings:* **1. Venus 2. Color of Venus 3. Clouds on Venus.**—*S. Nowinska.*

1958

12J–43 523.42:521.15

Gusev, I. I., **Nabliudeniia vrashcheniia Venery.** [Observations of the rotation of Venu *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 23(30):51–54, **1958.** 5 figs., 4 re **DLC**—Observations of Venus from 1929 to 1950 were analyzed in order to determine its rotati The north polar cap exhibited a rapid rotation around its center. In 24 hrs the white oval turn more than one full turn and after 16 days returned to its initial position. Hence, the rotation per is computed: $T = 24 \text{ hrs} - (24/16) \text{ hrs} = 22 \text{ hrs } 30 \text{ min}$. Observations of a stationary bright spot a of other details concur with the obtained result. *Subject Heading:* **1. Rotation of Venus.**—*S. N winska.*

12J–44 523.42:521.15

Kuimov, K. V., **Venera v 1954 g.** [Venus in 1954.] *Vsesoiuznoe Astronomo-Geodezichest Obshchestvo, Biulleten'*, No. 21(28):30–32, **1958.** 2 figs., table, 3 refs. **DLC**—Observations of Ve were made and recorded in drawings by several investigators at Moscow Planetarium. The pla was observed through a 131 mm Zeiss refractor magnifying 150 times during a period of maxim distance of Venus from the Earth (May 25–Aug. 26, 1954). Observed were: phases of the plan dependence of the dark segment at the terminator upon the phase, and details on the disk. Th appeared to be a uniform movement of the details during the period of observation. If such mo ment is assumed as real, it would indicate a rotation period of approximately 20–35 days. *Sub Headings:* **1. Venus drawings 2. Rotation of Venus.**—*G.T.*

12J–45 523

Makarova, S. P., **Venera v 1956 g.** [Venus in 1956.] *Vsesoiuznoe Astronomo-Geodezichesk Obshchestvo, Biulleten'*, No. 23(30):46–50, **1958.** 5 figs., 2 tables, 3 refs. **DLC**—Observations Venus during evening elongation March 23 to June 13, 1956 by the planetary division of Mosc Planetarium Observatory were reported. The deviation between observed and calculated ph $\Delta P = P_0 - P_e$ was tabulated and plotted in a graph. The maximum negative ΔP was found at ph 0.58. The relation of cusp lengthening to phase was analyzed, the results differing from previ observations. *Subject Heading:* **1. Venus.**—*S. Nowinska.*

12J–46 523.42:523.164.

†Mayer, C. H.; McCullough, T. P. and Sloanaker, R. M. (*all, U. S. Naval Research Lab., Wa D. C.*), **Observations of Venus at 3.15 cm wave length.** *Astrophysical Journal*, Chicago, 127(1):1– Jan. **1958.** 3 figs., 18 refs., 2 eqs. **DLC** (QB1.A9)—The observations of radiation from Venus 3.15 cm wave length on 34 days in May–June, 1956 are described. The apparent black-b temperature for Venus derived from the measurements changed from about 620°±110°K (m.e.) early May to about 560°±73°K (m.e.) near inferior conjunction. Two single observations at 9 4 wave length are described, which suggest that the radiation follows a thermal spectrum. *Sub Headings:* **1. Temperature of Venus 2. Radio emission from Venus.**—*Authors' abstract.*

12J–47 523.42:535.33:521.1

Richardson, Robert S. (*Mt. Wilson and Palomar Obs.*), **Spectroscopic observations of Venus rotation made at Mt. Wilson in 1956.** *Astronomical Society of the Pacific, San Francisco, Publicati* 70(414):251–260, June **1958.** 3 tables, 11 refs., 2 eqs. **DLC** (QB1.A4)—Instruments and phot raphy, reduction, observational checks, inclination of rotational axis to line of sight, results fr previous determinations (of rotational period) and from observations in 1956, and finally, ra

observations of Venus are the topics covered. Tabular data are included. *Subject Headings:* **. Spectroscopic observations of Venus 2. Rotation of Venus 3. Mt. Wilson, Calif.**—*A.J.M.*

12J–48 523.42

Zotkin, I. T. and Shereshevskaia, A. E., **Forma serpa i detali na Venere v 1951 g.** [The shape of the crescent and details on Venus in 1951.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, 23(30):39–45, **1958.** 6 figs., 3 tables, 9 refs. **DLC**—The planetary division of the Moscow Planetarium Observatory observed Venus at daylight from March 18 to Sept. 2, 1951 during its eastern elongation. Venus phase changed from 0.87 to 0.01. The deviation between the observed and calculated phase was tabulated for determining the scattering of light by the Venus sky. The lengthening of the crescent cusps was observed and the relationship between cusp prolongation and phase angle was suggested. Details on Venus disk were obtained by superposing drawings by various observers; however, the character of rotation could not be established. A general view of Venus in 1951 was presented in a typical crescent picture exhibiting peculiarities proper to this phase: crepuscular segment, brightening at the cusps and variable cloud formation on the disk. *Subject Headings:* **1. Venus cusps 2. Clouds on Venus.**—*S. Nowinska.*

1959

12J–49 523.42:521.83

Alksnis, A. and Alksne, Z. (*Astrofizich Lab. AN Latv. S.S.R.*), **Nabliudeniia pokrytiia Regula Veneroĭ.** [Observations of occultation of Regulus by Venus.] *Astronomicheskiĭ Tsirkuliar*, Moscow, No. 204:3–4, Sept. 15, **1959.** Also: Astapovich, I. S., **Nabliudeniia pokrytiia α L'va Veneroĭ.** [Observations of occultation of α Leonis by Venus.] *Ibid.*, p. 4–5. **DLC**—Two sets of simultaneous observations of an occultation of Regulus by Venus were made on June 7, 1959 at the Astrophysical Laboratory of the Academy of Sciences, Latvian S.S.R. near Baldone. One set of observations was made with a Zeiss refractor (20 cm dia, $F=300$ cm, magnification ×150) and another with a smaller refractor (8 cm dia, and magnification ×80). The timing and characteristics of various phases of occultation are given. The observations of occultation of α Leonis by Venus were made on June 7, 1959 at the Mayak Observatory with a 200 mm refractor (ABP-2) (magnification ×74). The stars were well visible at daytime. The characteristics of various phases of occultation and their timing are reported in detail. *Subject Headings:* **1. Occultation of Regulus by Venus 2. Occultation of α Leonis by Venus.**—*N.P.S.* Ⓢ

12J–50 523.42:521.83

Dommanget, J. (*Royal Observatory, Uccle*), **Essais de détermination du rayon apparent de Vénus par l'observation de son passage devant Regulus le 7 juillet 1959.** [Attempts at determining the apparent radius of Venus by observing its passage before Regulus on July 7, 1959.] *Ciel et Terre*, Brussels, 75(11/12):325–336, Nov./Dec. **1959.** 3 figs., 4 refs. **DWB, DLC**—It is difficult to determine the apparent diameter of Venus because of its slightly transparent atmosphere and therefore, the observation of the passages of this planet on the solar disc is of great interest. But these passages are very rare. The occultation of a star by a planet presents a similar interest which is evidenced by the case of the occultation of Regulus by Venus on July 7, 1959. The author describes the instrument used and the observation technique. Disappearance and re-appearance of Regulus behind the disc of Venus were observed and micrometric measurements of the relative positions successively occupied by the two bodies were required. The author briefly discusses the calculations made and the steps followed to determine the radius of planets through observing their passages before the stars. According to results of the observations made on July 7, 1959 at Uccle, Venus is supposed to have, at a distance of one astronomical unit, an apparent radius equal to $7'', 89 \pm 0'', 28$ that is to say a smaller radius than that ($8'', 41$) generally adopted for the calculation of ephemeris. The author suggests possible explanations for this difference: refraction of the luminous rays issued from Regulus during their passage in the atmosphere of Venus and great density of the atmosphere of Venus which plays an important role in absorption. *Subject Headings:* **1. Venus atmosphere 2. Occultation of Regulus by Venus 3. Venus diameter 4. Uccle, Belgium.**—*A.V.* Ⓢ

12J–51 523.164.8:523.42 551.501.81:523.42

Evans, J. V. and Taylor, G. N. (*both, Jodrell Bank Exp. Station, Univ. of Manchester*), **Radio echo observations of Venus.** *Nature*, London, 184(4696):1358–1359, Oct. 31, **1959.** fig., 2 refs. **DLC, DWB**—During Sept. 1959 an attempt was made to observe radio echoes from the planet Venus using the 250 ft radio telescope at Jodrell Bank. The radar equipment used with the telescope operated at 408.99 Mc/s; transmitted power was 50 kW; pulse-length was 30 msec and pulse repetition rate 1 per sec; receiver noise figure was 4.6 db and band width 60 cps. The equipment failed to detect echoes stronger than the noise level so integrating equipment was used to make an analysis of the signals for echoes weaker than the receiver noise-level. Results given are not in agreement

with the work of R. PRICE et al. (*see* 12J–57, this bibliog.) which suggested that the radar cro section of Venus was equal to the physical area presented by its disk. (*Same item as* 11L–12 *Met. Abs.*) *Subject Headings:* **1. Radar echoes from Venus 2. Venus 3. Jodrell Bank, En** —*A.J.M.*

12J–52 523.42:523.036.51:523.164.3

Gibson, J. E. and McEwan, R. J. (*both, U. S. Naval Research Lab., Wash., D. C.*), **Observatio of Venus at 8.6 mm wavelength.** (In: Paris Symposium on Radio Astronomy, July–Aug. 19 [**Proceedings**]. pub. Stanford Univ. Press, **1959.** p. 50–52. fig., 3 refs.) **DLC** (QB475.P26) This paper discusses the observation of Venus at 8.6 mm in order to determine the brightness te perature of the dark side of Venus at this wavelength. The equipment used is described and t method employed is discussed. Temperature is estimated as being between 250 and 570°K. *Subj Headings:* **1. Temperature of Venus 2. Radio emission from Venus.**—*A.J.M.* Ⓢ

12J–53 523.42:535

Heyden, F. J.; Kiess, C. C. and Kiess, Harriet K. (*all, Georgetown Coll. Obs., Wash., D. C*) **Spectrum of Venus in the violet and near-ultraviolet.** *Science*, Wash., D. C., 130(3383):11 Oct. 30, **1959.** fig., 7 refs. **DLC**—Recent observations of the spectrum of the planet Venus, w spectrographs of low and high dispersion at the Georgetown College Observatory, show that a wi continuous absorption band is present in the violet and near-ultraviolet. The band begins n wavelength 4500 Å and extends to the short wavelength limit of our spectrograms near 3800 Å. I similar in structure to the strong absorption, reported by others, for gaseous nitrogen tetroxi (*Same item as* 11.7–121, *Met. Abs.*) *Subject Headings:* **1. Venus 2. Absorption bands 3. Sp trographic observations of Venus 4. Washington, D. C.**—*Authors' abstract.*

12J–54 523.42:523.7:521.15

†Link, F. (*Astron. Inst., Acad. Sci., Prague*), **Passages de Venus sur le Soleil.** [Transit Venus across the Sun.] *Bulletin of the Astronomical Institutes of Czechoslovakia*, Prague, 10(4):1 115, **1959.** 13 figs., tables, 42 refs., 24 eqs. **DLC**—For the last 200 years transits of Venus ac the sun have been observed systematically. As a side product of these observations, refract phenomena in the atmosphere of Venus were noted but no attempt has been made so far to undert a thorough study of such phenomena. In this paper the author proposes to undertake such a stu He gives a theoretical treatment of refraction applied to the atmosphere of Venus and tabul visual observations made by various investigators during the 1761, 1769, 1874 and 1882 tran From these he draws the following conclusions: a) the aureole observed during transits of Venu a refracted image of the sun; b) the value of refraction at the level of transparency is 0.7–1.7 w corresponds to a pressure of less than $\frac{1}{10}$ of an atmosphere at this level; c) variations of refrac clearly show the existence of polar and equatorial regions as well as seasons on the planet; d) fl the above facts it is obvious that the rotation period of Venus must be considerably shorter t its sidereal period. *Subject Headings:* **1. Venus transits across the Sun 2. Atmospheric refrac on Venus 3. Rotation of Venus.**—*G.T.* Ⓢ

12J–55 523.42:551.510.4:523.03

†Mintz, Yale (*Consultant to Engrg. Div., Rand Corp.*), **Temperature and circulation of the V atmosphere.** *Rand Corporation, Santa Monica, Calif., Paper* 1736, June 25, 1959, revised Sept **1959.** 39 p. 12 figs., table, 24 refs., 17 eqs. **DWB** (M(055) R186p)—It is assumed that the vi surface of Venus is the top of a layer that is opaque to radiation in all wavelengths, and the radi equilibrium temperature of the surface and the overlying CO_2 atmosphere is computed. The r surface temperature is found to be −5°C and the temperature lapse rate of the atmosphere, u the Earth's atmosphere, to be convectively stable. The small diurnal range of radiometri measured temperature is attributed to a large heat capacity of the visible layer, and the conclu drawn that the visible layer is a liquid body, or ocean. The possible chemical composition of ocean is discussed. From the appearance of the planet in visible and in ultraviolet light, a form c general circulation is inferred in which there are low-level cells that transport heat from low to latitudes and from the daylight to the night side of the planet, surmounted by a circumpolar vo *Subject Headings:* **1. Venus atmosphere 2. Temperature of Venus.**—*Author's abstract.* Ⓢ

12J–56 551.510:5

Newkirk, Gordon, Jr. (*High Altitude Obs., U. of Colorado, Boulder*), **The airglow of V** *Planetary and Space Science*, N. Y., London, 1(1):32–36, Jan. **1959.** 3 figs., 7 refs. **DLC**— dispersion, high speed spectra of the unilluminated portion of Venus show emission featur 4415 Å and 4435 Å which agree in position with those found by KOZYREV. KOZYREV'S other emi bands are not corroborated by these spectra. A previously unreported emission band ma

resent at 4050 Å. The radiance of the emission bands centered at 4420 Å is about eighty times that f the 5577 Å line of the terrestrial airglow. It is unknown whether the emission from the dark side f Venus is of airglow of auroral character. (*Same item as* 10.10–86, *Met. Abs.*) *Subject Headings:* **1. Airglow of Venus 2. Emission bands of Venus.**—*Author's abstract.*

12J–57 551.501.81:523.42 523.164.8:523.42

Price, R.; Green, P. E.; Goblick, T. G. et al., **Radar echoes from Venus.** *Science*, Wash., D. C., 29(3351):751–753, March 20, **1959.** fig., table, 8 refs. Also: Puzikov, L. D., **Radarnoe Eko ot enery.** [Radar echo from Venus.] *Priroda*, Moscow, No. 2:80, Feb. **1960.** [Abridgement of rticle in *Science.*] **DLC**—It is possible to obtain radar echoes from celestial bodies outside the arth-Moon neighborhood. Scientific evaluation of such information has engendered the present xperimental investigation conducted on Feb. 10th and 12th, 1958, about 2 weeks after Venus' losest approach to the Earth. In order to collect the data, five separate runs were made. Four f these have been processed and summarized. Two of the four were successful and the over-all esults are given. (*Same item as* 11H–120, *Met. Abs.*) *Subject Headings:* **1. Radar echoes from enus. I. Kingston, R. H. II. Kraft, L. G., Jr. III. Pettengill, G. H. IV. Silver, R. V. Smith, W. B.**—*N.N.*

1960

12J–58 551.501.81:523.42 523.164.8:523.42

Radar echoes from Venus. *Sky and Telescope*, N. Y., 18(7):384–385, May **1959.** fig., photos. lso: **The planets: Venus II** (Pt. 2). *Ibid.*, 20(1):27–28, July **1960.** photos. **DWB, DLC**—uccessful radar contact with Venus on Feb. 10 and 12, 1958 has been announced by the Lincoln aboratory of the Massachusetts Institute of Technology. The antenna used was the 84 ft radio elescope on Millstone Hill near Westford, Mass. Success was made possible through the use of a olid-state maser to amplify the returning signals. PRICE believes that at the frequency used 440 Mc) the reflection is from the body of the planet itself and not from an ionosphere around it. ross correlations for observations are illustrated. Pt. 2 indicates that much of the art of observing enus consists of distinguishing between actual and false markings and in minimizing the latter hrough careful choice of techniques. The discussion includes a description of the instruments of bservation, a consideration of some observing problems and of methods of observation. Several enus photographs illustrate the article. *Subject Headings:* **1. Venus 2. Radar echoes from Venus . Westford, Mass.**—*E.Z.S. & I.S.* Ⓢ

12J–59 523.42:521.862

de Vaucouleurs, Gérard and Menzel, D. H. (*both, Harvard College Obs., Cambridge, Mass.*), **Results of the occultation of Regulus by Venus, July 7, 1959.** *Nature*, London, 188(4744):28–33, ct. 1, **1960.** 7 figs., 3 tables, 2 refs. **DLC**—Results of observations from many sources are tabuted and discussed. A tentative atmospheric model has been derived from an examination of these esults. *Subject Headings:* **1. Occultation of Regulus by Venus 2. Venus atmosphere.**—*R.B.* Ⓢ

12J–60 523.42:551.510

Dole, S. H. (*Rand Corporation*), **The Venusian atmosphere.** *Lunar and Planetary Exploration olloquium, Proceedings*, 1(5):12–18, March 18, 1959 (re-issued as bound vol., **1960**). 4 figs., 2 tables. **WB, DLC**—Some new approaches to the problem are presented. After a summation of the factual nowledge on Venus and current views of its surface conditions, correlations with other terrestrial odies and the similarity of earth and Venus serve as a means to these approaches. As illustrated by diagram of the dimensions, masses and densities of other terrestrial planets the logarithm of their ean density equals a constant times the mean radius, plus the logarithm of their mean density of ypical uncompressed rock. Fundamental physical difference between earth and Venus are due en- irely to the quantity of solar radiation. The consequences of almost doubling the intensity of earth's olar radiation to match that received by Venus are enumerated and illustrated by the principal proc- sses in earth's atmosphere compared to the suggested processes in Venus' atmosphere. Composition f the Venusian atmosphere is presented in a table on the basis of which suggested density versus alti- ude for the Venusian atmosphere is illustrated. The highest level of dust carried from the surface to 0 km after the eruption of Krakatoa in 1883 would reach 41 km in the Venusian atmosphere. In a ompletely dry atmosphere beneath the dust cloud the surface would probably be in complete dark- ess. *Subject Heading:* **1. Venus atmosphere.**—*O.T.* Ⓢ

12J–61 523.42:778.3

Dollfus, Audouin; Boyer, Ch. and Camichel, Henri, **Etude photographique de Vénus en lumière iolette et ultra-violette.** [Photographic study of Venus in violet and ultra-violet light.] *L'As*

tronomie, Paris, 74(9):375–381, Sept. **1960.** 3 figs., 6 refs. **DLC, NNC**—The analysis of the pho graphs of Venus in violet light taken daily by Ch. Boyer at Brazzaville and by H. Camichel at Pic-du-Midi revealed the existence of transitory moving cloudy formations. The instruments u are briefly described and the observational techniques are considered. Each author gives a perso interpretation of the curious periodicity of evolution of those formations on the basis of his o observations. According to the observations of Ch. Boyer, the evolution of the cloudy formati should present an apparent periodicity of 4 or 5 days. The periodic re-appearance of these clo configurations might be explained by the action of convective movements in the atmosphere Venus. The period of 4 or 5 days should correspond to the average time between the evolu of an atmospheric disturbance and the appearance of the following one. Furthermore, it does seem definitely ascertained that Venus always rotates with the same side towards the Sun; rotation speed should be faster than that of revolution. *Subject Headings:* **1. Venus atmosph 2. Clouds on Venus 3. Photographic observations of Venus 4. Pic-du-Midi, France.**—*A.V.* Ⓢ

12J–62 523.42:551.

Edson, James B. (*Research & Dev. Dept. Army*), **Measuring the Venusian atmosphere Russel's method.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1(5):22–30, March 1959 (re-issued as bound vol., **1960**). 17 figs. **DWB, DLC**—Some not widely known results of s studies of the atmosphere of Venus are offered in regard to astronautic probing. The thin crescen Venus is shown on some series of photographs with markedly dissymetrical cusp extension and striking pattern of its prominent red spot as sketched, suggesting some unknown feature rel perhaps to its climate and rotation. The observations of a Planet Group at the Smithsonian S Observation Station on Table Mountain, Calif., at the inferior conjunction around June 27, 194 described as contrasted to the first photographs of the phenomenon, Nov. 14 to 26, 1938. The c puted curve of increasing illumination and visible cross section of the atmosphere shows a total di ence from that of the observed red and blue points for 1938, failing to support the hypothesis dusty Venus atmosphere. The computed curve of another model, assuming an opaque cloud surmounted by a very clear, thin gas atmosphere and a cirrus-like cloud deck is in more accord the observations. A model consistent with the observations is described. Some other perti information about the Venus atmosphere is assembled. The only marking, except the red sto certainly recognized on Venus are the ultraviolet "clouds." It is natural to think of relating t to the "cirrus" cloud layers indicated by the inferior conjunction observations. An observati program as a part of the Venus probe program is suggested. *Subject Heading:* **1. Venus atmosph** —*O.T.* Ⓢ

12J–63 523.164

Kraus, J. D. (*Radio Obs., Ohio State Univ., Columbus, Ohio*), **Apparent radio radiation at wavelength from Venus.** *Nature*, London, 186(4723):462, May 7, **1960.** 3 refs. **DWB**—A cri review of preliminary communications referring to the reception of 11 m radiation from the pl Venus in 1956 (*see* 12J–33, this bibliog.). The author's conclusion is that to determine the existe or nonexistence of such radiation beyond any doubt, further observations are needed using a b equipment than was available in 1956. (*Same item as* 11.12–65, *Met. Abs.*) *Subject Hea* **1. Radio emission from Venus.**—*E.K.*

12J–64 523.164

Kuz'min, A. D. and Salomonovich, A. E., **Radioizluchenie Venery v 8-mm diapazone** [Radio emission of Venus on 8 mm.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(2):297–300, M April **1960.** 2 figs., 10 refs., 3 eqs. Russian and English summaries p. 297. Translation English in *Soviet Astronomy AJ*, New York, 4(2):279–282, **1960. DLC**—This paper report results of observations of radio emission from Venus in the 8-mm bandwidth, made during Se Nov. 1959, on the 22-m radio antenna at the Lebedev Physics Institute of the Academy of Scie U.S.S.R. The brightness temperature, averaged over the visible planetary disk for 17 days follo inferior conjunction, was $315° \pm 70°$K. An increase in brightness temperature with incre distance from inferior conjunction was detected. Some inferences are drawn on the physical c tions prevailing on Venus. *Subject Heading:* **1. Radio emission from Venus.**—*Authors' abstra*

12J–65 5

Moore, Patrick and Cattermole, Peter J., **The markings of Venus.** *British Astrono Association, Journal*, 70(3):130, March **1960.** 2 plates, 4 refs. **DWB, DLC**—An experime described for testing a hypothesis concerning the dark shadings on Venus. A globe of 1.4 in. dia was illuminated by a light source and was viewed with a 3 in. refractor from a distance of 230 The appearance was very much like Venus. Six different drawings by six different observe included. *Subject Heading:* **1. Venus markings.**—*A.H.K.* Ⓢ

12J–66 523.42

Obendorfer, H., **Erfahrungen und Ergebnisse bei der Beobachtung des Planeten Venus.** [Experiences and results in observation of the planet Venus.] *Die Sterne*, Leipzig, 36(7/8):142–150, July/Aug. **1960.** 9 figs. **DLC**—The purpose of this article is to consolidate the experiences and results in the field of visual observation of Venus. The author attempts to organize and to analyse all phenomena and effects visually observed with instruments of all importances. The article is based on several years of observation. No conclusions are drawn about the great number of registered impressions. A list of the different instruments, the conditions and techniques of observation are presented. *Subject Headings:* **1. Visual observations of Venus 2. Planetary observation instruments.**—*A.V.* Ⓢ

12J–67 523.42:521.862

Pauscher, H. (*Potsdam-Babelsberg*), **Mikrometermessungen bei der Bedeckung von α Leonis durch Venus.** [Micrometer measurements during the occultation of α Leonis by Venus.] *Astronomische Nachrichten*, Berlin, 285 (5/6):226–228, Sept. **1960.** 2 tables, 3 refs., eqs. German summary p. 226. **DLC**—Measurements were made at the time of contact of the occulted star with the southern cusp of the planet Venus. Results show no shifting of the lightbeam which could definitely be attributed to the refraction in crossing the atmosphere of Venus. Slight deviation from the Venus ephemeris presented in BAJ. *Subject Headings:* **1. Venus atmosphere 2. Occultation of α Leonis by Venus.**—*O.T.* Ⓢ

12J–68 523.42:551.521

†Sagan, Carl, **Radiation balance of Venus.** California Institute of Technology, Pasadena. Jet Propulsion Lab., Contract NASw-6, Technical Report 32–34, Sept. 15, **1960.** 23 p. 5 figs., table, 35 refs., 35 eqs. **DWB** (523.42 C153ra)—The radiation balance of Venus was first discussed by WILDT, who showed that the amount of CO_2 then believed to exist above the cloud layer could cause a moderately efficient greenhouse effect. For a slowly rotating Venus, WILDT calculated that the subsolar noontime surface temperature would exceed 400°K. In this Report, the inverse procedure is adopted. The surface temperature is taken from recent radio observations, and the properties of the atmosphere are deduced. In Sec. II, the radio spectrum and the possibility of nonthermal emission are discussed; the resulting model atmosphere for CO_2 is given in Sec. III. The requirements for atmospheric absorption in the far infrared, imposed by the radiation balance, are described in Sec. IV. Semi-empirical equations of radiation balance are derived in Sec. V, where applications are made to the atmospheres of both Venus and Earth, the latter as a test of the reliability of the equations. Section VI describes a model of the Venus cloud layer and a comparison of the model with observations. Finally, the origin of the derived Venus atmosphere is treated in Sec. VII. A good bibliography of 75 items, dating from 1899 to 1960, is included. *Subject Headings:* **1. Radiation balance of Venus 2. Venus atmosphere.**—*Author's introduction & A.J.M.* Ⓢ

12J–69 551.521.9:523.42:621.396.8 523.42:523.036.51

†Sinton, William M. (*Lowell Obs., Flagstaff, Ariz.*) and Strong, John (*Johns Hopkins Univ.*), **Radiometric observations of Venus.** *Astrophysical Journal*, Chicago, 131(2):470–490, March **1960.** 5 figs., 6 tables, 31 refs. **DWB, DLC**—Modern infrared techniques were applied to the measurement of thermal radiation and temperatures of planets. The two nearest planets have the maximum of their thermal emission within the 8–13μ band that is transmitted by our atmosphere with relatively little absorption. The transmission of the atmosphere was determined by extrapolation of observed planetary emission to outside the atmosphere, using the square-root law. Calibration of the equipment was made with black bodies. The method of determining atmospheric transmission was tested in the laboratory with an ammonia cell, to simulate a planetary atmosphere, and a rock, to simulate a planet. Radiation temperatures for the rock within a few degrees of the thermometer temperature were obtained in these tests. Extensive measurements were made of Venus with the 100-inch telescope in 1953, and further measurements were made in 1954. The temperature at the center of the disk was found to be −39°C. Scans near dichotomy show that the dark side of the disk is nearly as hot as the bright side. There is also substantial limb darkening. A cold region found at the north cusp in 1953 appears to be related to a bright cloud found in ultraviolet photographs taken on the same date. Spectra of Venus between 8 and 13μ were obtained with prism and grating spectrometers. A diffuse band at 11.2μ was found in the spectrum of Venus in addition to a carbon dioxide band at 10.4μ. The 10.4μ band was found much weaker than expected. (*Same item as* 11.10–104, *Met. Abs.*) *Subject Headings:* **1. Radiometric observations of Venus 2. Temperature of Venus.**—*Authors' abstract.*

1961

12J–70 523.164.352:523

†Barrett, Alan H. (*Univ. Michigan Obs., Ann Arbor, Mich.*), **Microwave absorption and emiss in the atmosphere of Venus.** *Astrophysical Journal*, Chicago, 133(1):281–293, Jan. **1961.** 5 fi 2 tables, 29 refs., 28 eqs. **DWB, DLC.** Also shorter article in: *Journal of Geophysical Resea* Wash., D. C., 65(6):1835–1838, June **1960.** 2 figs., 10 refs., 3 eqs. **DLC**—The radio-astronomi observations of Venus are analyzed in terms of a model atmosphere and the known microw absorbing properties of CO_2 and H_2O. The model atmosphere is taken to consist of an adiaba region with a temperature gradient of 9.0°K/km and an isothermal region with a scale height 6.86 km and a temperature of 285°K. The surface temperature is assumed to be 580°K. centimeter and millimeter radio data require surface pressures between 10 and 30 terrestrial mospheres on the basis of the assumed model and atmospheric compositions of 75 per cent C 22–25 per cent N_2, and 0–3 per cent H_2O. *Subject Headings:* **1. Radio emission from Venus 2. T perature of Venus 3. Venus atmosphere 4. Atmospheric composition of Venus.**—*A uthor's stract.* Ⓢ

12J–71 523.42:551.510.41:546

Firsoff, V. A., **On carbon dioxide in the atmosphere of Venus.** *The Observatory*, Lon 81(921):62–64, April **1961.** 8 refs., 4 eqs. **DLC**—The author presents a theory dealing with thermodynamic motion of CO_2 on Venus. This theory attempts to explain two facts: 1) the hi stratospheric temperature of Venus relative to lower levels and 2) the motion of CO_2 into, subsequent concentration within, the Cytherean stratosphere. *Subject Headings:* **1. Venus mosphere 2. Atmospheric composition of Venus 3. Carbon dioxide in the atmosphere of Ve** —*A.J.M.* Ⓢ

12J–72 523.42:521

†*Menzel, Donald H. and de Vaucouleurs, Gérard (*both, Harvard College Obs.*), **Final report on occultation of Regulus by Venus, July 7, 1959.** Harvard Univ. Harvard College Observat Contract AF 19(604)-7461, Scientific Report No. 1, Jan. 10, **1961.** 134 p. numerous figs., nume tables, numerous refs., 77 eqs. **DWB**—The occultation of the first-magnitude star Reg (α Leonis) by the planet Venus on July 7, 1959 was observed photographically, photoelectric and visually by seven groups of observers from the Harvard College Observatory and the Sm sonian Astrophysical Observatory. In the first part of this report the observations are reporte detail; in the second part corrections to the ephemeris coordinates differences between the p and the star, and a determination of the height, $h=70$ km, of the occulting layer above the o layer are given. In the third part, the photometric observations are used to derive the scale he $H=6.8$ km, and its first derivative $H/z=0.01$ H and the total pressure $p=2.6$ dynes cm^{-2} a occulting layer. *Subject Headings:* **1. Occultation of Regulus by Venus 2. Venus atmosp** —*Author's abstract.* Ⓢ

12J–73 5

Moore, Patrick (*Royal Astronomical Society*), **Probleme der Venus-Forschung.** [Proble Venus research.] *Weltraumfahrt*, Frankfurt a.M., 12(2):36–38, March/April **1961.** photo. man summary p. 36. **DLC**—Research on Venus is extremely difficult due to the fact that we ca see the surface of the planet. The rotation period and position of the axis of revolution of V are still matters of controversy, and consequently, little can be said about temperature condi on the surface of Venus. Latest spectrographic observations of the planet's atmosphere show it contains considerable amounts of water vapor. The presence of ionized nitrogen in the spe of Venus supports the hypothesis that the "ashen light" is caused by electrical phenomena i planet's atmosphere. Latest findings also support the theory that large portions of the surfa Venus are covered with water masses. *Subject Headings:* **1. Venus 2. Water on Venus.**—*T of author's abstract.* Ⓢ

12J–74 5

Sagan, Carl (*Space Sci. Lab., Dept. Astronomy, Univ. of Calif.*), **The planet Venus.** *S* Wash., D. C., 133(3456):849–858, March 24, **1961.** 3 figs., 47 refs. **DLC**—A wide-ranging d sion on various aspects of Venus including composition of the atmosphere, nature of clouds position, spectra, etc.), optical and microwave temperatures, early history and present s conditions, and life on Venus as related to possible atmospheric structures. Two pages cont 50 photos of Venus illustrate the discussion. *Subject Headings:* **1. Venus 2. Venus photo 3. Clouds on Venus.**—*A.J.M.* Ⓢ

12J–75 523.164.8:523.42 551.501.81:523.12

Victor, W. K. and Stevens, R., **Exploration of Venus by radar.** *Science*, Wash., D. C., 134(3471):46–48, July 7, **1961.** 2 figs., 2 refs. **DLC**—A new tool is available to scientists for exploring the solar system, and modern-day explorers are discovering new worlds by radar. On May 10, 1961 a radar signal was beamed at the planet Venus, and for the first time in history the return echo was detected within a few minutes. A new value for the Astronomical Unit has been determined. The data indicate that Venus rotates slowly and that it is a better radio reflector than the moon. *Subject Heading:* **1. Radar echoes from Venus.**—*Authors' abstract.* Ⓢ

MARS

1893

12J–76 523.43:551.5

Pickering, William H., **Martian meteorology.** *Harvard University. Harvard College Observatory, Annals*, 53(8):155–171, **(1893?).** 9 photos, 6 tables. **DWB, DLC**—A detailed analysis of photographs of Mars made in 1888 and 1890. The author interprets various markings on successive photographs as changing cloud patterns and snow caps. Tables, plates and figures illustrate the analysis. *Subject Heading:* **1. Martian meteorology.**—*A.J.M.*

1908

12J–77 523.43:577.4

Lowell, Percival (*Obs., Flagstaff, Arizona*), **Mars as the abode of life.** New York, Macmillan Co., **1908.** 288 p. numerous figs., tables, eqs. **DLC** (QB641.L924)—The book presents eight lectures delivered by the author and of which his studies of Mars form but a part. From the data collected at the Observatory at Flagstaff, light has been thrown upon the evolution on the planets as worlds, resulting in a thesis of which this book is a presentation. The book is written for professionals, as well as for nonprofessionals. In Pt. 1 the genesis of a world, the evolution of life, the dominant role of Sun, Mars and the future of the Earth, the canals and oases of Mars, and the proofs of life on Mars are discussed. In Pt. 2, the validity of each step in the argument is demonstrated with references to the corresponding phases in the text. The density of the atmosphere on Mars, determined from the albedo, is about 2/9 of the Earth's, over similar square unit of surface. The barometric pressure is 64 mm, the mean temperature 8.7°C or 47.7°F. *Subject Headings:* **1. Martian environment 2. Life on Mars 2. Planetary evolution 3. Flagstaff, Ariz.**—*E.K.*

1930

12J–78 523.43

Antoniadi, Eugene Michel (*Meudon Obs.*), **La planète Mars, 1659–1929. Etude basée sur les résultats obtenus avec la grande lunette de l'Observatoire de Meudon. . . .** [The planet Mars 1659–1929. A study based on results obtained by means of the great telescope of the Meudon Observatory.] Paris, Herman, **1930.** 239 p. 150 figs., 10 plates. **DWB** (M/0405 A635)—The study gives an account of the observations of the planet Mars, carried out from the beginning of the century at the observatory of Meudon, and at the same time presents an analytical evaluation of important works of the author's predecessors, in order to obtain a satisfactory conception of the topography, meteorology and of the physical conditions on the surface of Mars. In Pt. 1, the generalia are discussed, such as: historical summary of ancient times; instruments and observation stations; astronomical and physical elements; the spots of the surface; the illusion of canals; the polar snow caps; the atmosphere; clouds and winds; the physical conditions and habitability, and the two satellites of Mars. The snow-covered poles of Mars, the effects caused by variations in the solar radiation on the diminution of the martian snow, and the dark belts surrounding the polar caps are treated in Ch. VI; the observations in connection with the atmospheric cover, the clouds in various color, the dominant role of the sun on the martian winds, their velocity, the different kinds of winds, and the protuberances of snow on the terminator are discussed in Ch. VII. Pt. 2 of the study presents an exhaustive and thorough picture of the contemporary topography of the planet with an evaluation of related works since HUYGHENS. *Subject Headings:* **1. Mars 2. Paris, Meudon Observatory, France.**—*E.K.*

1939

12J–79. 523.43(02)

Maggini, Mentore, **Il pianeta Marte.** [The planet Mars.] Milan, Ulrico Hoepli, **1939.** 397 p. 146 figs. (some fold.). **DLC** (QB641.M3)—A very important contribution to the Italian scientific

literature. The treatment covers the various aspects of the planet: the movement, opposition perio its satellites, duration of days, month and seasons, the topographic characteristics such as cana polar caps etc. In the discussion, the prominent persons who contributed to our present knowled about Mars, including the Italian astronomers: GALILEO, CASSINI, SCHIAPARELLI, CERULI ANTONIADI, etc. are noted. In the last part of the study the Martian atmosphere and climate a considered. The observation of the yellow and white clouds and the bright protuberances suppo the existence of an atmosphere, the altitude of which, according to Wright, should be about 100 k Infrared and ultraviolet photography lead to decisive observations. Atmospheric conditions, t existence of oxygen and water vapor, and spectroscopic observations of chlorophyll bands are eviden of vegetative life. The mean temperature on the surface of the planet was found around 20° *Subject Heading:* **1. Mars.**—*E.K.*

1942–1947

12J–80 523.43:57

Pressman, Ronald E., **Climate and vegetation of Mars compared with the Earth's.** *Brit Astronomical Association, London, Journal,* 52(6):193–197, July **1942.** 2 figs. Also: Mau A. J. P., **Vegetation on Mars.** *Ibid.,* 52(8):264–265, Sept. **1942. DLC** (QB1.B75)—The first pa is a rather interesting and somewhat outspoken discussion attempting to draw a coherent pict of climatic conditions and possible vegetation on Mars. The author utilizes astronomical obser tions and unifies his hypotheses by using analogies from meteorological processes on earth. Spec topics covered include deposition of moisture, polar caps, deserts, Martian atmospheric circulati clouds, etc. MAUDE presents a brief criticism of PRESSMAN'S article and also pertinent observati regarding Mars' distance from the sun as affecting possible climate. A suggestion as to how eq torial vegetation might obtain enough water for its continued existence is offered. *Subject Headi* **1. Martian climate 2. Life on Mars.**—*A.J.M.*

12J–81 523.43:55

de Vaucouleurs, Gérard, **Détermination de la pression atmosphérique sur la planète Mars photométrie visuelle.** [Determination of atmospheric pressure on Mars by visual photometr *Académie des Sciences, Paris, Comptes Rendus,* 220(23/26):903–904, June 25, **1945.** 6 refs., e **DLC**—In this note a new value of the Martian atmospheric pressure is considered. It has b obtained by visual observations during the opposition of 1939, and based on the intensity of g patches of the planet's atmosphere. *Subject Heading:* **1. Martian atmospheric pressure.**—*E.K.*

12J–82 52

de Vaucouleurs, Gérard, **Le problème Martien.** [The problem of Mars.] Paris, Elze **1946.** 63 p. figs. (*Editions Elzevir Problèmes,* 7.) **DLC** (QB641)—An objective study of present status of the problem of Mars is attempted in presenting a view of established results tentative theories. The chapter on generalities deals with: the biennial period of opposition and period of revolution (15 years); the difficulties of research arising from the remoteness of the pl and the uncertainty of visual observations; physical facts about the planet (seasons, length of satellites); ancient observations and cartography. Various facets of the Martian atmosphere climate are covered including atmospheric composition, methods of observation and study, clo polar caps, deserts, seasonal variations, etc. A historical account of the Martian canals is g with discussions for and against the well-known canal theory. Good illustrative material is inclu *Subject Heading:* **1. Mars.**—*O.T.*

12J–83 52

Sharonov, Vsevold Vasil'evich, **Mars.** Moscow, Izdatel'stvo Akademii Nauk SSSR, 1 179 p. 44 figs. (2 fold.), 14 tables, eqs. At head of t.p. *Akademiia Nauk SSSR Nauchno-P liarnaia Seriia.* **DLC** (QB641.S48)—A popular book by one of the most quoted Russian autho Martian studies. The book is divided into five chapters dealing with the problems of life on M celestial mechanics of the planet, its landscape, atmosphere and canals respectively. In the cha on the Martian atmosphere (p. 111–151) the various techniques of observation (occultation of s diffusion of light into dark area, blurring of detail around the edge of the disk, presence of clouds, are described. The Wright effect and its refutation by Russian scientists as being an app effect due to "photographic irradiation" are treated at length. The theory of determinin mospheric density from photometric observations is briefly explained and preliminary atte made in this field are mentioned. Knowledge on clouds and winds and on the chemical compos of the Martian atmosphere is reviewed. Finally climatic conditions on Mars and especially the conditions as affected by solar radiation, albedo, cloudiness, atmospheric circulation, "hotl effect," etc. are treated. The use of balloon-borne radiometers is described and illustrated. excluding all mathematics but describing physical details with considerable clarity the a

succeeds in giving considerable insight into the problems of Martian investigations without making any demand on the reader. *Subject Heading:* **1. Mars.**—*G.T.*

1948

12J–84 523.43:551.510:551.576

Dollfus, Audouin, **Etude polarimetrique de la lumière réfléchie par les nuages et l'atmosphère de la planète Mars.** [Polarimetric study of the light reflected by clouds and atmosphere of the planet Mars.] *Académie des Sciences, Paris, Comptes Rendus,* 227(6):383–385, Aug. 19, **1948.** fig., 6 refs. **DLC**—A brief note of observations which led to the following conclusions: the white clouds of the planet consist of ice crystals; the structure of the blue clouds has an apparent resemblance to the mother-of-pearl clouds of the terrestrial atmosphere; there is a deviation in the plane of polarization; and, finally, the brilliance of the Martian atmosphere in the center of the disk would be 0.06 that of the clear regions of ground which corresponds to an atmospheric pressure of 6 cm Hg. *Subject Headings:* **1. Martian polarization 2. Martian clouds 3. Albedo of Mars.**—*E.K.*

12J–85 523.43:551.510.41

Hess, Seymour Lester, **Meteorological approach to the question of water vapor on Mars and the mass of the Martian atmosphere.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract Cwb-7896, Report No. 1, Jan. 1–July 1, **1948.** 15 p.) **DWB** (523.4 F574L). Also in: *Astronomical Society of the Pacific, San Francisco, Publications,* 60(356):289–302, Oct. **1948.** 2 figs., table, eqs. **DLC, DWB** (523.43 H586m)—This paper is intended as an attempt to reconcile the contradictory evidence provided by visual and radiometric techniques on the one hand, and spectroscopic techniques on the other, by examination and computation in the light of meteorological knowledge and techniques. The author covers: water vapor vs. CO_2 as the element forming Martian "polar caps"; possible types of clouds; consequences of the existence of low-level water clouds and high-level convective clouds and, finally, computation of the surface vapor pressure and surface atmospheric pressure. *Subject Heading:* **1. Martian water vapor.**—*A.J.M.*

12J–86 523.43:551.5

Hess, Seymour Lester, **Investigation of the meteorology of Mars.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract Cwb-7896, Report No. 2, July 1–Dec. 31, **1948.** p. 1–23.) **DWB**(523.4 F574L)—A detailed report on Martian meteorology covering: general description of Mars; vertical atmospheric structure and the blue clouds; polar caps; temperature distribution and atmospheric circulation. Future plans for observation of Jupiter and processing data for Mars are outlined briefly. The report contains many formulas, graphs, photos and figures. *Subject Heading:* **1. Martian meteorology.**—*A.J.M.*

1949

12J–87 523.43:535.36:778.3

Blackadar, Alfred K., **Scattering of blue light in the Martian atmosphere.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Report No. 1, Aug. 1–Oct. 31, **1949.** 6 p. 3 refs. Also: *Ibid.*, **Annual Report,** Sept. **1950.** p. 3–18. figs., photo, 12 refs.) **DWB**—The theory of isotropic scattering in a plane atmosphere of finite optical depth, developed by CHANDRASEKHAR and VAN DE HULST is reviewed and is applied to measurements of the brightness of Mars made on blue photographs. The optical depth of the blue haze was found to be between 0.10 and 0.15 at an estimated effective wave length of 4350 Å. Almost half or more, depending upon the angles of view and illumination of blue light from Mars, was reflected by the atmosphere. A procedure for determining optical depth by photographing a model of Mars of appropriate contrast and albedo through various scattering media is described. *Subject Headings:* **1. Astrophotography 2. Martian atmospheric scattering.**—*From author's abstract.*

12J–88 523.43:551.521.3:577.4

Hess, Seymour Lester, **Mars.** (In: Flagstaff, Arizona. Lowell Observatory, **The project for the study of planetary atmospheres.** Contract Cwb-7896, Report No. 3, Jan. 1–June 30, **1949.** p. 1–5.) **DWB** (523.4 F574L)—FRANCK has pointed out that if the blue-green areas of Mars are mainly plant life, then some mechanism must exist to protect these plants from ultra-violet radiation since this light will damage proteins and other large organic molecules necessary to life. The ozone layer, which performs this protective function on earth, is apparently absent on Mars due to a lack of oxygen. The possibility remains, however, that the blue haze in the Martian atmosphere serves as a partial substitute for ozone since it selectively scatters light of short wave length and so may

sufficiently attenuate the UV before it reaches the surface. If the blue haze does indeed perfor the function indicated, then, during occasional periods of clearing of the blue haze, the plants oug to suffer some damage (not necessarily fatal) and this damage may well be expected to manife itself through slight changes in color of the dark markings. This color change may be observal and thus, if recorded, would verify, at least in part, the hypothesis on the function of the blue haz The report concerns the testing of this hypothesis; procedure and results are outlined. Prelimina verification of the hypothesis resulted from this test. *Subject Headings:* **1. Martian atmosphe absorption 2. Life on Mars 3. Blue haze on Mars.**—*Author's introduction & A.J.M.*

1950

12J–89 523.43:551.521.3:57

Hess, Seymour L., **Color changes on Mars.** (In: Flagstaff, Arizona. Lowell Observato **The project for the study of planetary atmospheres.** Contract AF 19(122)-162, Report No. Nov. 1, 1949–Jan. 31, **1950.** p. 6–8. Also: *Ibid.*, **Annual Report,** Sept. **1950.** p. 34–38. refl **DWB**—The author discusses the hypothesis of plant life on Mars and attempts to verify it investigating the relationship between changes in the opacity of the "blue haze," which abso UV radiation, and change in color of the dark surface markings. Color filter photographs wh were taken during the oppositions of 1939 and 1941 and which were in the visible red of the spectr were used to test the effect of blue haziness upon color of markings and a confirmatory result v obtained in 1941 but not in 1939. (*Same item as* 4.6–257, *Met. Abs.*) *Subject Headings:* **1. Mart atmospheric absorption 2. Life on Mars 3. Blue haze on Mars.**—*I.L.D.*

12J–90 551.510.528:52

Goldie, A. H. R., **The Martian atmosphere.** *Weather*, London, 5(9):329, Sept. **1950.** **DWB**—Calculates height of tropopause on Mars as 50 km in middle latitudes and 67 km at equat (*Same item as* 11–55 and 5D–164, *Met. Abs.*) *Subject Headings:* **1. Tropopause height 2. Mart tropopause.**

12J–91 551.5:523

Hess, Seymour L., **Some aspects of the meteorology of Mars.** *Journal of Meteorology*, 7(1):1– Feb. **1950.** 11 figs., 12 refs., 19 eqs. Review by Hermann Flohn in *Naturwissenschaftliche Ru schau*, Stuttgart, 4(1):26, Jan. **1951. DWB**—A thorough treatment of the various observed p nomena on Mars and the derived meteorological conditions (pressure, density, convection, atm pheric circulation, temperature, atmospheric composition, clouds, dust storms, polar caps, wa vapor and CO_2). A model of the stratosphere is constructed, and isothermal and isobaric cha prepared for northern winter in Mars. An attempt is made to explain the yellow and blue clou Similarities and differences between the general circulation on Mars and the Earth are discuss A number of excellent photographs of Mars, showing the polar ice caps, the yellow clouds and blue clouds, are reproduced. Work for this paper was done at Lowell Observatory. (*Same item* 5–9, *Met. Abs.*) The review by FLOHN mentions HESS's findings on pressure, division of the mosphere into troposphere and stratosphere and particularly the horizontal distribution of t perature and wind regime. (*Same item as* 4.2–20, *Met. Abs.*) *Subject Heading:* **1. Martian met ology.**—*M.R.*

12J–92 52

Lohmann, Werner, **Neuere Marsforschungen.** [Recent investigations of Mars.] *Naturwis schaftliche Rundschau*, 3(4):156–161, April **1950.** 3 figs., 2 refs. **DLC**—The author summar information on the climate and atmosphere of Mars, obtained with the aid of modern astrophys methods. The density and constitution of the atmosphere—the presence of water vapor, ca dioxide, oxygen and ozone—and the possibility of the existence of plant life under the atmosph conditions of Mars are discussed. (*Same item as* 2.8–177, *Met. Abs.*) *Subject Headings:* **1. Plane atmospheres 2. Mars.**—*I.L.D.*

1951

12J–93 551.58:523.43

†de Vaucouleurs, Gérard, **Physique de la planète mars: introduction à l'aréophysique.** [Phy of the planet Mars: introduction to areophysics.] Paris, Albin Michel, **1951.** 420 p. 50 29 tables, 78 refs., eqs. **DLC** (QB641.V29). English translation with title **Physics of the pl Mars: introduction to areophysics.** p. 345–354. **DLC** (QB641.V293 1954)—This book giv surprising amount of information. The Martian atmosphere includes 3 cloud layers: 1) bluish-w clouds at 10–30 km (probably droplets or crystals of CO_2 due to intense afternoon convecti 2) a violet layer at 10–15 km (finely divided matter of unknown origin); and 3) a yellow layer at

km, probably dust. Wind circulation is deduced from cloud drift; a chart for northern winter, with fronts and isobars, rather resembles earth in Jan. Atmospheric pressure at ground 87 ± 8 mb, variation with height Z (km) given by $\log P_s = 1.94 - 0.025z$. S. L. Hess finds a tropopause (about -160°C) at 40–50 km. At very high levels there may be an ionosphere and auroras. Air composition: N_2, 98.5%; Argon, 1.2; CO_2, 0.25; O_2, probably under 0.1%; O_3 still less. "Martian climatology" gives calculated distribution of radiation, and surface and air temperatures derived by various methods. Soil temperature averages -23°C for whole disc, -10 at equator to -60 at poles, annual range 120° at S pole, 30° in tropics; diurnal range in tropics 50°C. Dark regions hottest. Air temperature near ground 30° lower than ground. Pt. 3 deals with polar caps, of ice, snow and rime only a few cm thick. A dark fringe in spring is probably liquid water. Deserts are intensely dry; dark areas have more water vapor, but no chlorophyll plants. (*Same item as* 4.4–4, *Met. Abs.*) *Subject Headings:* **1. Planetary climates 2. Mars 3. Martian physics textbooks.**
I. Hess, S. L.—*C.E.P.B.*

12J–94 551.54:523.43

Dollfus, Audouin, **Détermination de la pression atmosphérique sur la planète Mars.** [Determination of atmospheric pressure on Mars.] *Académie des Sciences, Paris, Comptes Rendus*, 232(11):1066–1068, March 12, **1951.** 10 refs., eqs. **DWB**—The atmospheric pressure on Mars has been studied by polarization measurements of the light from Mars. The methods are: 1) difference between polarization at the center and at the edge of the disc; 2) the difference between these two areas for green and orange; 3) comparison of polarization curves for different areas of the surface for green and red. It is estimated that the atmosphere on Mars has a pressure of 83 millibars at the ground surface. (*Same item as* 3.1–11, *Met. Abs.*) *Subject Heading:* **1. Martian atmospheric pressure.**—*I.L.D.*

12J–95 551.5:523.43

Kubashev, B. M., **Novye dannye o meteorologicheskikh usloviiakh na Marse.** [New data on meteorological conditions on Mars.] *Priroda*, Moscow, 40(1):46–48, Jan. **1951.** 2 figs., 5 refs. **DLC**—The author describes the techniques for observation of radiation and thermal conditions on Mars and analyzes the charts (constructed by S. L. Hess, *see* 12J–91, this bibliog.) of pressure and temperature distribution on the surface of Mars. (*Same item as* 3.6–14, *Met. Abs.*) *Subject Heading:* **1. Martian atmosphere.**—*C.K.*

12J–96 523.43:551.521.3

Schatzman, Evry, **Sur les particules diffusantes dans l'atmosphère de Mars.** [Diffusing particles in the Martian atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 232(18):692–693, Feb. 19, **1951.** table. **DLC**—Simple considerations concerning the extinction in the Martian atmosphere permit the determination of the diameter of diffusing particles supposedly being spherical and in the range of 1.33 to 0.15μ. *Subject Headings:* **1. Martian atmospheric absorption 2. Diffusion by particles in Martian atmosphere.**—*Transl. of author's abstract.*

12J–97 551.510.41:523.43

Schoenberg, E., **Meteorologie der Mars-Atmosphäre.** [Meteorology of Mars' atmosphere.] *Sternenwelt*, Munich, 3(5/6):82–86, May/June **1951.** 5 figs. **DLC**—Radiometric temperature measurements of the surface of Mars and photographs of the planet served as a basis for these considerations regarding various properties of the Martian atmosphere. Discussed in particular are: 1) chemical composition of the air, 2) the polar caps (identified as condensed water vapor in the air above the poles), 3) the behavior of clouds and fog, 4) horizontal and vertical distribution of atmospheric temperature, pressure and density (with data presented in graphs), and 5) the atmospheric circulation (chart). The description of the probable atmospheric structure of Mars is based on a theory proposed by S. L. Hess. (*Same item as* 5.6–90, *Met. Abs.*) *Subject Headings:* **1. Martian atmosphere 2. Radiometry of Mars.**—*G.T.*

12J–98 523.43:577.4

Strughold, Hubertus (*Dept. of Space Medicine*), **Life on Mars in view of physiological principles.** *U.S. School of Aviation Medicine, Randolph Field, Texas, Special Report* [unnumbered], March **1951.** Reprinted in its **Epitome of space medicine.** Article No. 3. [8 p.] 4 figs., 25 refs.—On the assumption that the laws of biology are the same in the entire universe and that the structure of living matter is based on the carbon atom, the author discusses the problem of life on Mars in the light of present knowledge of physiological responses to limiting factors of temperature, oxygen and water. The temperature ranges within which active life processes proceed on earth (-60°C to 60°C), the temperatures on the surface and atmosphere of Venus, Mars and moon are discussed leading to the conclusion that Mars and possibly Venus possess temperature conditions favoring the existence of

life in our sense. The oxygen pressures, compatible as determined experimentally indicate tha neither homeothermic nor higher poikilothermic animals can exist on Mars because of lack of oxygen The evidence on the possible existence of vegetation on Mars, such as the seasonal discoloration o Mars, the fact that the temperature minimum, light minimum, carbon dioxide content and th presence of water, is summarized. Possible adaptation of lichens and liverworts to low O_2 pressur and to water, poor environments and the vegetation hypothesis for life on Mars are discussed. *Sub ject Headings:* **1. Life on Mars 2. Mars 3. Venus.**—*I.L.D.*

12J–99 521.035.313:523.4

†Tikhomirov, V. S., **Sezonnye izmeneniia nekotorykh otrazhatel'nykh svoĭstv rasteniĭ i vopros rastitel'nosti na Marse.** [Seasonal change in some reflective characteristics of vegetation an problems of vegetation on Mars.] Alma-Ata, Akademiia Nauk Kazakhskoĭ SSR, **1951.** 102 p 88 figs., 14 tables, 48 refs. **DLC**—In this monograph an attempt is made to determine the possibilit of vegetation on Mars from the seasonal spectral reflectivity curves obtained during 1924–193 compared with KRINOV's curves for seasonal variations in numerous species of terrestrial plants c trees, a large number of which are reproduced in the present work. The 4 main chapters cove I. History, II. Methodology, III. Astrobotanical work on Mars and IV. Seasonal changes in spectra reflectivity of various classes of plants, especially under the influence of heavy frost. It is show that the spectral reflectivity curves for the Martian "Lakes" do not conform with those for an terrestrial plant species, even under conditions of severe frost. This is especially true in the infrare end of the spectrum. Studies such as these are valuable in determining the albedo of the plan earth at different seasons. (*Same item as* 8G–88, *Met. Abs.*) *Subject Headings:* **1. Spectral re flectivity of Mars 2. Spectral reflectivity of plants 3. Seasonal albedo variations 4. Astrobotan 5. Mars.**—*M.R.*

1952

12J–100 521.035.313:523.4

Barabashov, N. P., **Ob issledovanii razlichnykh obrazovaniĭ na Marse.** [Investigation various phenomena on Mars.] *Astronomicheskiĭ Zhurnal*, 29(5):538–555, Sept./Oct. **1952.** 7 table 13 refs. **DLC**—Detailed tabular and descriptive analysis of observations of the brightness (spectr reflectivity) or albedo of various "seas," "gulfs," "lakes" and "continents" of Mars, made by th author with blue, green and red filters in 1931, 1935, 1939, 1941 and 1950. Other observations we made in 1920, 1924, 1926 and 1930. Conclusions drawn regarding the atmosphere, surface coverin in equatorial and polar regions and along the edges when the sun rises or sets or changed noon angl The "seas" have regions of varying albedo and colors ranging from green to yellow to blue to reddis and on the continents the albedo and shading changes with time of day. The "seas" become mo reddish when the noonday sun is lower and more bluish when it is higher. On the continents t albedo in red is as high as .448, yellow .190 and green .193. (*Same item as* 5.3–168 and 8G–20 *Met. Abs.*) *Subject Headings:* **1. Albedo of Mars 2. Martian atmosphere.**—*M.R.*

12J–101 523.43:612:581

Strughold, H. (*Dept. of Space Medicine*), **Ecological aspects of planetary atmospheres wi special reference to Mars.** *Journal of Aviation Medicine*, 23:130–140, April **1952.** 5 figs., 50 re (Reprinted in: U. S. School of Aviation Medicine, **Epitome of space medicine** [Reprints 1950–1957 Article No. 17.)—The author discusses the application of physiological and ecological princip relevant to manifestations of life on earth to the physical environments on other planets. Life other planets is examined from the point of view of the limiting factors of oxygen and temperatu an adaptation to such limits by living organisms. The author reviews the temperature limits living matter, the temperatures found on Mars and Venus, the oxygen requirements of living matt the chemical constituents of the atmosphere of Mars and Venus, including oxygen, carbon dioxi and water vapor, light conditions on these planets, and adaptation of liverworts and lichens minimum conditions of oxygen and carbon dioxide. Also Haber's hypothesis on life on Venus discussed. Graphs are presented showing surface temperatures on the planets, the atmosphere Mars, oxygen pressure on earth and Mars and diurnal temperature variations in the southern tropi regions of Mars near midsummer of the Southern Hemisphere. *Subject Headings:* **1. Life on Ma 2. Planetary climates 3. Life on Venus 4. Planetary ecology 5. Mars 6. Venus.**—*I.L.D*

1953

12J–102 523.4:577.4:06

Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, **Diskussiia na temu: Osnovn dostizheniia sektora astrobotaniki i vopros o vozmozhnosti zhizni na drugikh planetakh (25 sentiabria 1952 g.).** [Discussion of the theme: Basic achievements of the Section of Astrobota

and the problem of the possibilities of life on other planets, Sept. 25–27, 1952.] Its *Trudy*, Vol. 2, **1953.** Issued Alma-Ata. 167 p. figs. (For listing of pertinent articles, *see* Pt. III, this issue, *Met. Abs.*) **DLC** (QK1.A35866)—A three-day conference was held at Alma-Ata on physical conditions and the possible existence of life on planets, especially on Mars. In addition to the staff of the section of Astrobotany, Academy of Sciences of Kazakh S.S.R. and representatives of scientific institutions in Alma-Ata, members of the Academy of Sciences of the U.S.S.R. also participated. Present was V. G. FESENKOV, academician and editor of *Astronomicheskiĭ Zhurnal* (leading publication in astronomy in the U.S.S.R.), whose views on plant life on Mars sharply conflict with those held by TIKHOV (Section of Astrobotany) and his collaborators. This volume contains the proceedings of the conference, including all discussions. The first part of the proceedings contains three formal papers delivered by scientists at the Section of Astrobotany: Tikhov, G. A., **Osnovnye zadachi i dostizheniia Sektora Astrobotaniki Akademii Nauk Kazakhskoĭ SSR** [Basic tasks and achievements of the Section of Astrobotany, Academy of Sciences of the Kazakh SSR], p. 12–21; Kucherov, N. I., **Sovremennoe sostoianie voprosa o rastitel'nosti na Marse** [Present status of the question of plant life on Mars], p. 22–34; and Kutyreva, A. P., **Biologicheskie osnovy astrobotaniki** [Biological bases of astrobotany], p. 35–57. In these papers physical conditions on planets are discussed from the point of view of their biological significance. The rest of the proceedings contains the texts of the statements (and concluding remarks) of some 20 participants, the most extensive being that of V. G. FESENKOV who gives a historical summary of Martian exploration and review of latest results in this field and describes the most likely temperature, cloudiness, circulation, moisture, chemical and other conditions on Mars. Speaking about the presence of oxygen, FESENKOV states that the upper limit of its amount on Mars is 1/1000 of the amount on Earth; this upper limit has a tendency to decrease as methods of measurement become more accurate and the total absence of oxygen in the atmosphere of Mars is a distinct possibility. The statements and lively discussions by the other participants contain numerous details of considerable interest. *Subject Headings:* **1. Astrobotany conferences 2. Life on planets 3. Alma-Ata, Kazakh S.S.R.**—*G.T.*

12J–103 523.43

de Vaucouleurs, Gérard, **Mars.** *Scientific American*, 188(5):65–73, May **1953.** photos. **DWB**—After describing the well-established facts about the planet (characteristics of orbit and globe; seasonal changes of polar ice caps; extent of desert areas), the author discusses probable atmospheric composition of Mars, the possible plant life and the controversial problem of canals. Photographs showing various sizes of ice caps are presented. *Subject Headings:* **1. Life on Mars 2. Polar ice 3. Mars.**—*G.T.*

12J–104 523.43:523.035.3

Rosen, Boris (*Astrophys. Inst., Liège Univ.*), **Origine possible de la couche violette dans l'atmosphère de Mars.** [Possible origin of the haze layer in the atmosphere of Mars.] *Annales d'Astrophysique*, Paris, 16(4):288–289, July/Aug. **1953.** 9 refs. **DLC**—The haze layer (a layer absorbing blue and violet light) of the Martian atmosphere and its investigation by various authors are discussed. The author proposes a new hypothesis according to which the absorption phenomenon might be due to carbon dust (smoke) suspended in the outer layers of the planet's atmosphere. *Subject Heading:* **1. Blue haze on Mars.**—*G.T.*

12J–105 551.54:523.43

Vorob'ev, A. G., **Novye dannye o davlenii atmosfery na Marse.** [New information on atmospheric pressure on Mars.] *Priroda*, Moscow, No. 6:84–85, June **1953.** 2 refs. **DLC**—With reference to newest information contained in the latest articles by A. DOLLFUS, DE VAUCOULEURS and KUIPER treating the question of the intensity of atmospheric pressure on the planet Mars, the author discusses the correctness of their determinations, compares them with results obtained earlier and comes to the conclusion that the most trustworthy value of its intensity must be between 85 and 95 mb with a fluctuation of about 9 mb at different points of its surface. Taking into consideration that the weight of bodies is three times lighter on Mars than on the earth the author claims that airplane flights there from the earth are perfectly feasible. (*Same item as* 7.1–246, *Met. Abs.*) *Subject Heading:* **1. Martian atmospheric pressure.**—*A.M.P.*

1954

12J–106 523.035.3:523.43

Dollfus, Audouin, **Recherche de la vapeur d'eau dans l'atmosphère de la planète Mars, faite en ballon libre, vers 7000 m d'altitude.** [Study of the water vapor of the atmosphere of the planet Mars, made on a free balloon at 7000 m altitude.] *Académie des Sciences, Paris, Comptes Rendus*, 239(16):954–956, Oct. 18, **1954.** 7 refs. **DWB**—The Martian atmosphere resembles the earth atmosphere at 6500 m. The spectral band of water vapor for 8250 Å was measured at that altitude.

The precipitable water was 0.25 mm. *Subject Headings:* **1. Balloon observations 2. Absorptio by water vapor 3. Martian water vapor.**—*A.A.*

12J–107 523.43:581.

Fesenkov, V. G., **K voprosu o rastitel'nosti na Marse.** [The problem of vegetation on Mars] *Akademiia Nauk SSSR, Doklady*, 94(2):197–198, **1954.** 2 figs. **DLC.** [**Comment by**] L. I Golosnitskiĭ in *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:259–268, **195** 2 eqs. Also: Kutyreva, A. P., **Oprovergaetsia li suschestvovanie rastitelnosti na Marse stateĭ V. G Fesenkova?** [Has the existence of vegetation on Mars been disproved by V. G. Fesenkov's article *Ibid.*, p. 269–271. And Suslov, A. K., **Faktor zhizni na Marse.** [The factor of life on Mars.] *Ibid* p. 272–273. **DLC** (QK1.A35866)—Shortly after noon the surface temperature of Mars is highes i.e. the incoming and outgoing radiations reach a state of equilibrium. Under such conditio $(1-A_1)Q=\sigma T_1^4$, where A_1 =albedo of the investigated planetary surface, T_1 =its effective temperatu and Q =amount of energy received from the sun. If vegetation is present, another parameter, t "biological activity factor" X, i.e. the portion of solar energy used for biological processes must added and the equation of radiative equilibrium becomes $(1-A_2)Q-XQ=\sigma T_2^4$. Applying t equation to known temperature conditions over light and dark areas on Mars it is found that t biological factor X is equal to zero. In the three critical articles FESENKOV'S purely mathematic approach to a biological problem, and the accuracy and pertinence of his arguments are attacke massive evidence of vegetation on Mars assembled throughout the years by the Section of Astr botany is recapitulated, and FESENKOV is charged with ignoring available positive fact in favor of oversimplified theory. *Subject Heading:* **1. Life on Mars.**—*G.T.*

12J–108 523.43:551.513:551.5

†McLaughlin, Dean B. (*Obs., Univ. of Michigan*), **Interpretation of some Martian feature** *Astronomical Society of the Pacific, San Francisco, Publications*, 66(391):161–170, Aug. **1954.** 2 fig plate, 11 refs. Also his: **Further notes on Martian features.** *Ibid.*, 66(392):221–229, Oct. **195** 21 refs. **DLC** (QB1.A4)—The Martian maria of the tropical girdle are interpreted as compos chiefly of dark volcanic ash drifted by the prevailing winds, which must be strongest during t summer of the southern hemisphere, when the winds cross the equator and become anti-trade win The vertices of the pointed bays are identified as active volcanoes, the sources of the ash. T curved flow pattern of the maria and intervening lighter strips are shown to be consistent with t expected deflection of the winds by the rotation of the planet. Canals that meet the maria in t pointed bays are interpreted as drifts of ash from the source volcanoes during the period of weak reversed winds of the northern summer. In the second paper, the author covers the followi topics: other explanations of canals, some anomalies of atmospheric circulation, possible height Martian volcanoes, the color of the maria, the seasonal changes and the deserts. *Subject Headin* **1. Martian features 2. Martian winds 3. General circulation on Mars.**—*Author's abstract A.J.M.*

12J–109 523.43:523.03

Martz, E. P., Jr. (*White Sands Proving Ground, Alamogordo, N. Mex.*), **Variation in atmosphe transparency of Mars in 1939.** *Astronomical Society of the Pacific, San Francisco, Publicatio* 66(389):45–51, April **1954.** 2 figs., 14 refs. **DLC** (QB1.A4)—The author discusses various theo covering the cause of Martian atmospheric transparency variations (e.g., vegetation, frozen C The discussion then turns to analysis of photographic observations made by the author in 193 hopes that these may throw more light on the nature of Martian surface and atmospheric phenome Sixteen pairs of photos, one of the pair in red light and the other in blue-violet light, are included illustrations of the textual analysis. The article concludes with another discussion of possi causes of the transparency variations. *Subject Headings:* **1. Martian atmospheric transpare variations 2. Atmospheric transparency of Mars.**—*A.J.M.*

1955

12J–110 523.4:577.4:0

Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, **Materialy Soveshchaniia po vopr o vozmozhnosti zhizni na drugikh planetakh, provedennogo Sektorom astrobotaniki i Leningrads otdeleniem Vsesoiuznogo astronomo-geodezicheskogo obshchestva (POVAGO) 23–25 fevralia 1 goda.** [Proceedings of the conference on the possibility of life on other planets, held by the Sec of Astrobotany and the Leningrad division of the All-Union Astronomical and Geodetic Soci Feb. 23–25, 1953.] Its *Trudy*, Vol. 4, **1955.** Issued Alma-Ata. 159 p. figs., foot refs. listing of pertinent articles *see* Pt. III, this issue, *Met. Abs.*) **DLC** (QK1.A35866)—This vol contains the complete proceedings of a Conference on Planetary Biology held in Leningrad on 23–25, 1953. This was the third conference on the subject in the U.S.S.R., the first two having

eld at Alma-Ata (*see* 12J–102, this bibliog.) and Minsk. Twenty-four scientists participated. The roceedings include both formal papers and extensive discussions in which all aspects of physical nd biological conditions on the planets, and particularly on Mars, are treated at length. Although omewhat loosely arranged and lacking quantitative data, the volume is a valuable contribution to lanetary science, especially inasmuch as it shows the way to a variety of approaches in interpreting lanetary observations, often through sharply polemic statements of conflicting views. *Subject Headings:* **1. Astrobotany conferences 2. Life on planets 3. Leningard, U.S.S.R.**—*G.T.*

12J–111 551.552:523.4:551.21

Barker, Robert, **The ash theory of Martian features.** *British Astronomical Association, Journal*, 55(6):235–236, June **1955. DWB**—Opposes the theory of D. B. McLaughlin (*see* 12J–108, this bibliog.) that markings on Mars are due to dust or volcanic ash carried by "trade winds." *Subject Headings:* **1. Martian circulation. I. McLaughlin, D. B.**—*C.E.P.B.*

12J–112 523.43:523.035.313

Glagolevskiĭ, Iu. V. and Kozlova, K. I., **K opredeleniiu spektral'noĭ iarkosti Marsa ob"ektivnoĭ prizmoĭ.** [Determination of the spectral brightness of Mars with an objective prism.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:77–80, **1955.** 2 figs., 3 tables, 2 refs., eq. **DLC** (QK1.A35866)—The main purpose of the study reported in this paper was to investigate the effect of variations in the visible area of maria upon the total reflectivity of the Martian surface. Measurements were made with an objective prism mounted on a telescope. As expected, the reflectivity in the yellow and red bands increased as the area of visible maria decreased. The results obtained appear to show the method of measurement to have considerable sensitivity. An attempt was also made to determine color temperatures of Mars. The preliminary results indicate the usefulness of the objective prism technique in investigating Martian color variations, particularly for the purpose of studying the atmosphere of Mars. *Subject Headings:* **1. Martian spectral brightness 2. Spectral reflectivity of Mars.**—*G.T.*

12J–113 523.43:581.12

Golosnitskiĭ, L. P., **Problema dykhaniia rastitel'nykh organizmov na planete Mars.** [Respiration of plant organisms on Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:90–101, **1955.** table, 12 refs. **DLC** (QK1.A35866)—Photosynthesis by Martian plants is made possible by the presence of CO_2 in the Martian atmosphere in double the quantity found in the Earth's atmosphere, the existence of water on Mars, and the transparency of the Martian atmosphere to solar radiation. It is difficult to determine the exact amount of water vapor and molecular oxygen in the atmosphere of Mars; but it is known that oxygen is less than 1% of the amount found on Earth. This paucity of oxygen has led some scientists to deny the possibility of life on Mars. The author suggests possible biological processes whereby plants could overcome this obstacle; one involving anaerobic breathing, and the other symbiosis of plants with micro-organisms which would directly supply the necessary oxygen to the plant. The paper also contains speculations concerning the evolution of the atmosphere of Mars. *Subject Headings:* **1. Martian atmospheric composition 2. Plant respiration on Mars.**—*G.T.*

12J–114 551.510.41:523.43:546.264

†Grandjean, J. and Goody, R. M. (*Imperial College, London*), **The concentration of carbon dioxide in the atmosphere of Mars.** *Astrophysical Journal*, Chicago, 121(2):548–552, March **1955.** 2 tables, 13 refs., 4 eqs. **DLC**—From observations of carbon dioxide bands in the spectrum of Mars made by G. P. Kuiper, we have redetermined the fraction by volume of this gas in the planet's atmosphere, taking into account the fine structure of the band and the shape of the rotation lines. If the ground-level pressure on Mars is 100 mb, we find that the fraction by volume of carbon dioxide is 50 times greater than in the earth's atmosphere. (*Same item as* 7.3–134, *Met. Abs.*) *Subject Heading:* **1. Martian carbon dioxide.**—*Authors' abstract.*

12J–115 523.43:581.9

Guérin, Pierre (*C. N. R. S., Paris*), **Les indices de vie végétale sur Mars.** [Indices of vegetable life on Mars.] *La Nature*, Paris, 3241:194–197, May **1955.** 3 figs. **DLC** (Q2.N2)—There is no scientific explanation which conflicts, at present, with the existence of planetary vegetation on Mars. This is the hypothesis which confirms the changes on the surface of the planet, although superior forms of life have not been found. Results were obtained through a long series of observations; physical measurements originated the new field of science, spectro-botany. The spectrophotometric study of the radiation of terrestrial vegetation might offer the possibility of measuring their adjustment to severe climatic conditions, the mean temperature of Mars varying between −20° and 30°C. The Martian atmosphere was found very rare, with blue and yellow clouds. The principal component

is probably nitrogen. Water vapor has not been found. The negative results of spectrosc measurements prove only the existence of great dry conditions in the Martian atmosphere. *Su Headings:* **1. Martian environment 2. Life on Mars.**—*E.K.*

12J–116 523.43:551.513:523.03

Ivanova, I. V., **Temperatura i atmosfernaia tsirkuliatsiia na Marse.** [Temperature and mospheric circulation on Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Tr* 3:81–87, **1955.** 2 tables, 6 refs. **DLC** (QK1.A35866)—A general review of the current knowle concerning the atmosphere and atmospheric processes on Mars, based on G. DE VAUCOULEU **Physique de la planète Mars** (*see* 12J–93, this bibliog.). *Subject Heading:* **1. Martian meteorol** —*G.T.*

12J–117 523.43:55

Ivanova, I. V., **O rel'efe Marsa.** [The relief of Mars.] *Akademiia Nauk Kazakhskoĭ S Sektor Astrobotaniki, Trudy*, 3:88–89, **1955.** 7 refs. **DLC** (QK1.A35866)—Contradictory evid advanced by various authors to prove the existence or lack of elevations on Mars is reviewed. author believes that arguments in favor of the existence of elevations appear to be convincing points to the evidence of water flow during spring thaw and to the distribution of vegetatio indications of orographic formations. *Subject Heading:* **1. Martian orography.**—*G.T.*

12J–118 523.43:523.035.313:5

Kozlova, K. I., **Sravnenie spektral'nykh krivykh "moreĭ" Marsa i nekotorykh zemnykh rast** [Comparison of spectral curves of the "seas" of Mars and of some terrestrial plants.] *Akade Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:102–111, **1955.** 9 figs., 8 tables, 7 refs. (QK1.A35866)—Tables and graphs showing albedo values of Martian maria at various wave len between 400 and 850 mμ, and similar data for a number of terrestrial plants are presented discussed. It is found that several plants growing in cold climatic conditions show the same spe albedo characteristics as the Martian maria over the entire spectral range investigated. *Su Headings:* **1. Spectral reflectivity of Mars 2. Astrobotany data 3. Life on Mars 4. Albed plants.**—*G.T.*

12J–119 523.43:523.035.3:53

Kozyrev, N. A., **Ob"iasnenie tsveta Marsa spektral'nymi svoĭstvami ego atmosfery.** [Exp tion of the color of Mars by the spectral properties of its atmosphere.] *Akademiia Nauk S. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia*, 15:147–152, **1955.** 3 figs., table, 4 refs., 5 Also Tikhov, G. A., **Po pvodu stat'i N. A. Kozyreva . . .** [Comment on N. A. Kozyrev's a . . . .] *Ibid.*, 16:159–161, **1956.** 2 figs., ref., eq. Tikhov's comment also pub. in *Akad Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 5:3–5, **1957.** 2 figs., table. **DLC**—A p metric comparison of spectra of Martian surface details and of the solar spectrum was made spectrograms of Mars obtained in 1954 with the 50 duim reflector of the Crimean Astrophy Observatory. The curves obtained and presented in this paper show that the maria and conti on Mars have the same proper colorings. The observed difference in colors is completely accou for by the properties of the Martian atmosphere. On the basis of this consideration the reflect of the atmosphere of Mars was determined for various wave lengths. The values obtaine tabulated. Apparently the surface of Mars has a proper albedo of about 0.45, with no signif variations in the visible spectrum. It is only the considerable atmospheric dust content v makes such a neutral surface to look bright red. On this assumption the dependence of the o thickness of the Martian atmosphere upon wave length is calculated and graphically represent TIKHOV takes exception to KOZYREV's statement and argues that the red coloring on Mars mu due to vegetation. *Subject Headings:* **1. Martian spectrum 2. Albedo of Mars 3. Life on M** —*Transl. of author's abstract and G.T.*

12J–120 523.43:

Krishtofovich, A. N., **K voprosu o rastitel'nosti na planete Mars.** [On the problem of vegeti on the planet Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:1 **1955. DLC** (QK1.A35866)— Minimum conditions under which plant life (or more prec albumin, a necessary constituent) can exist on Earth are discussed. Known or probable condi on Mars are such that, in the author's opinion, it is hard to assume the existence of a Martian resembling the terrestrial one. *Subject Headings:* **1. Life on Mars 2. Martian environment.**—

12J–121 523.43:523.

Kucherov, N. I., **Nabliudeniia Marsa v 1950 godu.** [Observations of Mars in 1950.] *demiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 3:48–62, **1955.** 3 tables. Also

Nabliudeniia Marsa v 1952 godu. [Observations of Mars in 1952.] *Ibid.*, p. 63–76, **1955.** 3 tables. **DLC** (QK1.A35866)—Observations of Mars made at Alma-Ata, at the Kamenskoe Plato mountain observatory near Alma Ata, and at the Tashkent Astronomical Observatory are reported. The observations were made visually, using three different telescopes with red, yellow, green and blue filters. The principal objective of the observations was to study conditions of cloudiness on Mars, as well as transparency of the Martian atmosphere and visibility of surface features. The periods of observation were Feb. 14–June 1, 1950 (winter in the southern hemisphere of Mars), and April 10–May 31, 1952. Results are reported in the form of some 200 diary entries, each entry giving the date and time of observation, filter used, part of the planet observed and details of the observed phenomena. Out of 74 days of observation there were only 4 cloudless days on Mars. Blue bands of clouds oriented both meridionally and latitudinally, and patches of clouds were seen and are described in some detail. Atmospheric transparency showed considerable variability. In one instance such variable transparency is attributed to the presence of haze, possibly consisting of small ice crystals and perhaps acting on a mechanism of moisture transfer from one polar cap to the other. In 1952 the Martian atmosphere was more transparent and less cloudy than in 1950. *Subject Headings:* **1. Martian cloudiness 2. Atmospheric transparency on Mars 3. Alma-Ata, Kazakh S.S.R. 4. Tashkent, U.S.S.R.**—*G.T.*

12J–122 523.43:551.571:577.4

Kucherov, N. I., **Planeta Mars kak vozmozhnyĭ nositel' zhizni: fizikokhimicheskie i klimaticheskie usloviia Marsa.** [Planet Mars as a possible carrier of life: physico-chemical and climatic conditions on Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy,* 4:28–43, **1955. DLC** (QK1.A35866)—Weather and climate on Mars, e.g. the nature and variations of polar caps, atmospheric structure and composition, moisture, temperature and cloudiness are described. The author emphasizes the presence of snow in large amounts. This and the observed transfer of moisture from one polar cap to the other by means of crystal clouds carried by air currents appear to indicate that the amount of water on Mars is larger than generally assumed. *Subject Headings:* **1. Life on Mars 2. Water on Mars.**—*G.T.*

12J–123 523.43

Kuiper, Gerard P. (*Yerkes Obs.*), **On the Martian surface features.** *Astronomical Society of the Pacific, San Francisco, Publications,* 67(398):271–282, Oct. **1955.** plate, 23 refs. **DLC** (QB1.A4)—The article is a review of information available on the nature of the large and small dark markings. The differences of opinion on the topography of this planet are discussed at some length. The author's study of Mars in 1948, 1950 and 1954 did not reveal long, narrow canals or a network of canals, but led to the conclusion that Mars is covered with a vast amount of topographic detail, all "natural" in appearance. The smaller patches appear to differ from the larger ones only in size. The observation of variation in colors during 1954 showed the apparent color dependent on seeing conditions. The discovery of CO_2 in the Martian atmosphere and the infrared spectrum of the polar cap showing ice to be frozen H_2O not CO_2, have greatly enhanced the probability that some primitive vegetation exists on Mars. *Subject Headings:* **1. Martian surface features 2. Martian atmospheric composition.**—*E.K.*

12J–124 523.43:551.556:551.21

†McLaughlin, Dean B., **Changes on Mars, as evidence of wind deposition and volcanism.** *Astronomical Journal,* New Haven, Conn., 60(7):261–270, Aug. **1955.** 9 figs., 27 refs. **DLC** (QB1.A3)—Evidence from moving clouds, summarized by DE VAUCOULEURS, supports the author's suggestion that extensive winds of monsoon type occur on Mars. The volcanic hypothesis, developed to explain the banded and oriented permanent maria and pointed "bays," accounts successfully for the greatest temporary changes observed on Mars. In several cases, a horn-shaped dark marking fanned out from a well-defined small source and showed curvature consistent with the Coriolis effect of the planet's rotation. Shifting boundaries of maria are interpreted as due to aeolian deposition of light-colored desert dust or of dark volcanic ash, accompanied by variable volcanic activity and changes of wind direction. In particular, the seasonal change of outline of Syrtis Major is explained by seasonal reversal of the winds. Distances of transport of ash on Mars are not excessive as compared with recorded cases on earth from Vesuvius, Mayon, etc. Amounts of ash required for any of the temporary markings are only a few cubic km, fairly comparable with ejecta of major terrestrial eruptions. Volcanism on Mars appears not to exceed greatly, if at all, that on earth at the present time. *Subject Headings:* **1. Martian wind regime 2. Volcanic dust on Mars.**—*Author's abstract.*

12J–125 523.43:522.61:778.38

Pettit, Edison and Richardson, Robert S. (*both, Mt. Wilson and Palomar Obs.*), **Observation of Mars made at Mount Wilson in 1954.** *Astronomical Society of the Pacific, San Francisco, Publica-*

tions, 67(395):62–73, April **1955.** 3 figs., 3 tables, foot-ref. **DLC** (QB1.A4)—A somewhat extend analysis of photographic observations of Mars with tables, graphs and figures to illustrate the te The method, instrument, and film used for observation are discussed. The analysis itself covers t canals, surface markings and the blue haze and clouds. *Subject Headings:* **1. Martian observatio 2. Photographic observations of Mars.**—*A.J.M.*

12J–126 523

Sinton, William M. (*Harvard College Obs.*), **New findings about Mars.** *Sky and Telesco* Cambridge, Mass., 14(9):360–363, July **1955.** 3 figs. **DLC** (QB1.S536)—A summary of world-w observations of Mars in 1954 is presented. Cooperating observatories are listed; some excell photos are included to illustrate the text. The author discusses some of the planetary featu observed, some atmospheric phenomena apparent in the photos, and temperature conditions Mars as found in the author's investigations. Equipment and film used are also discussed. *Sub Heading:* **1. Martian observations.**—*A.J.M.*

12J–127 523.43:522.61:778

Sytinskaia, N. N., **Sovremennoe sostoianie svedenii o prirode Marsa.** [Current knowledge the nature of Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 4:44–54, 19 **DLC** (QK1.A35866)—An attempt is made to compare the different interpretations of Martian servations and to indicate the relative reliabilities of the various findings. Considered in partic are observations and hypotheses concerning the atmospheric structure and composition, temperat polar caps, continents and maria. The author believes that the structure of the Martian atmosph as derived from WRIGHT'S red and violet photographs is erroneous. The Wright effect has b shown by BARABASHOV and SHARONOV to be unreal and due to the so-called photographic irradiat i.e. an apparent enlargement of the picture, different for the various spectral regions. *Sub Headings:* **1. Martian atmosphere 2. Wright effect 3. Photographic observations of Mars.**—

12J–128 523.43:5

Tikhov, G. A., **Zhizn' vo Vselennoĭ.** [Life in the universe.] *Akademiia Nauk Kazakhskoĭ S Sektor Astrobotaniki, Trudy*, 3:3–16, **1955.** 3 figs. **DLC** (QK1.A35866)—Physical condition Mars are discussed from the point of view of their suitability to support organic life. Compara curves of the spectral brightness of several terrestrial plants and of the Martian surface are presen A major portion of the article deals with foreign literature supporting the assumption of org life on Mars, and especially with Kuiper's **The Atmospheres of the Earth and Planets** (*see* 12I *Met. Abs.*). *Subject Headings:* **1. Life on Mars. I. Kuiper, Gerard Peter.**—*G.T.*

1956

12J–129 523.43:522.61:77

Barabashov, N. P. and Koval', I. K., **K voprosu o raznosti fotograficheskikh diametrov M v ul'trafioletovykh i krasnykh luchakh.** [On the difference of the photographic diameters of M in red and violet light.] *Astronomicheskiĭ Zhurnal*, Moscow, 33(6):890–892, **1956.** 5 figs., 4 ta 7 refs. Russian and English summaries p. 890. **DLC** (QB1.A47)—The decrease in the diam of the photographic images of Mars in the red and infrared is explained by the different distribu of brightness on the disk in different parts of the spectrum. It is shown that the diameter in infrared depends on the contrast of the photomaterial (plates, developer) in use. This phenom is not observed in the violet and ultraviolet. *Subject Headings:* **1. Photographic observatio Mars 2. Wright effect.**—*Authors' abstract.*

12J–130 523.43:522.61:7

Camichel, Henri (*Obs. du Pic du Midi*), **Observations photographiques de Mars faites a du Midi en 1954.** [Photographic observations of Mars made at Pic du Midi in 1954.] *Bu Astronomique*, Paris, 20(2):131–139, **1956.** 3 figs., 2 plates, table, eqs. French, English, Ge and Russian summaries p. 131. **DLC** (QB1.B9)—The observations of 1954 confirm the resu preceding oppositions. The position found for the pole is the same. The value for the rad the same as that found in 1941, but differs from that found in 1943, 1946, 1948 and 1950. The systematic errors have been found in the position of markings observed before and after the op tion. *Subject Headings:* **1. Photographic observations of Mars 2. Pic du Midi, France.**—*Au abstract.*

12J–131 551.510:5

Dollfus, Audouin (*Meudon Obs.*), **Les conditions météorologiques sur la planète Mars.** teorological conditions on the planet Mars.] *La Météorologie*, Paris, No. 42:81–91, April/June 8 figs., table, eqs. English and Spanish summaries p. 81. **DWB**—From photometric, spe

energy and polarimetric analyses of the light received from Mars or portions of it (Pic du Midi, since 1941) the author derives properties of the planet's atmosphere. Surface pressure is estimated to be 90 mb; reduced thickness of water content would be of the order of 0.1 mm, assuming 25% of saturation and a surface temperature between −30 and −40°C. The various types of clouds observed are described in particular detail (some shown in photographs). Seasonal phenomena and the hydrologic cycle are discussed. (*Same item as* 8.10–119, *Met. Abs.*) *Subject Headings:* **1. Martian meteorology 2. Pic-du-Midi, France.**—*G.T.*

12J–132 551.510:523.43

Firsoff, V. A., **Does water vapour escape from Mars?** *British Astronomical Association, London, Journal*, 66(2):53–59, Jan. **1956.** 10 refs., 5 eqs. **DLC**—Atmospheric conditions on Mars are set out—composition, temperature, lapse rate, surface pressure (83 mb). The mean altitude of the Martian tropopause is estimated as 30 km and all water vapor is frozen out below this level. The height of the ozone layer is estimated as 75 km; at night ozone may condense and break up into monatomic oxygen. No mechanism for the escape of oxygen and water vapor from Mars yet considered is confirmed. (*Same item as* 8.1–174, *Met. Abs.*) *Subject Headings:* **1. Atmospheric structure 2. Martian atmosphere 3. Water vapor escape from Mars.**—*C.E.P.B.*

12J–133 523.43:523.036.51

Gifford, Frank, Jr. (*Lowell Obs., Flagstaff, Ariz.*), **Surface-temperature climate of Mars.** *Astrophysical Journal*, Chic., 123(1):154–161, Jan. **1956.** 6 figs., 14 refs. **DWB, DLC**—The Lowell Observatory radiometric measurements of Martian surface temperatures are analyzed, and surface-temperature climatological properties of Mars are obtained. Annual and diurnal temperature variations and seasonal isotherm maps are displayed and discussed. *Subject Headings:* **1. Martian surface temperatures 2. Martian climate 3. Mars 4. Flagstaff, Ariz.**—*Author's abstract.*

12J–134 551.510:523.43(02)

Levitt, Israel Monroe (*Dir., Fels Planetarium of Franklin Inst.*), **A space traveler's guide to Mars.** N. Y., Henry Holt, **1956.** 175 p. figs., 25 refs. **DLC** (QB641.L426). Review by Robert Fleischer in *Scientific Monthly*, 84(4):214–215, April **1957. DLC**—In the eight chapters of this popular science book, the story of the investigations of the physical characteristics (motions, seasons, climate, temperatures), the moons, the surface features, the atmosphere, possibility of life and evaluation of the solar system are treated. All people on earth are said to be space travelers in the sense that they are on a whirling planet moving through space. However, Mars is the nearest "land" and so the one most likely to be visited. (*Same item as* 9.1–14, *Met. Abs.*) *Subject Headings:* **1. Martian atmosphere 2. Planetary atmospheres.**—*M.R.*

12J–135 523.43:577.4(02)

†Ley, Willy and von Braun, Wernher, **Exploration of Mars.** New York, Viking Press, **1956.** 176 p. 24 figs., 40 plates, 5 tables, bibliog. p. 172–176. **DLC** (QB641.L43)—A general survey of knowledge concerning the planet Mars is presented in this easily readable book. The history of observations, the motion of Mars, its satellites, the ice caps, the Martian canals, atmospheric conditions, etc., with opinions, hypotheses and theories, are discussed. As far as the authors are concerned, they assume that man will set foot on Mars within a matter of decades. Chs. 5–8 are a treatment of an imaginary expedition to Mars with excellent colored illustrations. A useful bibliography of books and important papers on Mars and related subjects, principally life on other worlds, is appended. *Subject Headings:* **1. Life on planets 2. Mars.**—*E.K.*

12J–136 551.510:523.43

†McLaughlin, Dean B. (*Univ. Mich.*), **New interpretation of the surface of Mars.** *Scientific Monthly*, Wash., D. C., 83(4):176–188, Oct. **1956.** 9 figs., table, 40 refs. Also his: **A new theory of the surface of Mars.** *Royal Astronomical Society of Canada, Journal*, 50(5):193–200, Sept./Oct. **1956.** 3 figs., 13 refs. **DLC**—The author believes that wind action plays an exceedingly important role in the geomorphology of Mars, and that water, snow, wave, glacier or artificial modifications of the terrain are nonexistent or at least unimportant. Bands and streaks appear oriented in directions of presumed prevailing winds and curve in conformity with Coriolis force. Volcanic ash carried by winds is also a prominent feature. Seasons vary more than on earth, though its inclination of 24.8° is about the same, its orbit is more eccentric so that vertical incidence insolation is 45% more in summer in the S. Hemisphere than in the N., but summers are much shorter. The atmosphere is rich in CO_2 and argon, but has very little water vapor, some cirrus clouds and many dust storms, a surface pressure of 83 mb and a temperature that occasionally goes above 0°C but often down to −70°C or lower. Eye observation is far superior to photography because of the long exposures (and distortion by surface turbulence) needed to make good large plates. The so-called canals have

never been seen with high magnification or on a photograph but only with low magnification tel scopes, so seem to disappear when more detail is obtained. Vegetation may exist in its lower form but cannot be proven to exist. Wind patterns show much stronger monsoon features than on earth because there is no tempering ocean area to modify them. Winds are strongest in the souther summer because of the greater heating and darker color of the S. Hemisphere. Canals may b vanes of dark volcanic dust or ash that follow prevailing winds but are not permanent. Clouds c condensed vapor may be seen during supposed volcanic eruptions. (*Same item as* 8.10–120, *Me Abs.*) *Subject Headings:* **1. Martian atmosphere 2. Martian meteorology.**—*M.R.*

12J–137 523.43:577.4(0

Nelson, Albert Francis Joseph Horatio Nelson (6th Earl), **There is life on Mars.** New Yor The Citadel Press, **1956.** 152 p. figs., bibliog. p. 143–145. **DLC** (QB54.N4)—In this thorough readable study the author concludes that the information of astronomers and scientists, and rece observations, prove that some form of life definitely exists on Mars. In order to support his assum tion the author examines the conditions under which life might exist. It is suggested that there is low form of vegetation of the lichen type; animal life seems improbable although the possibility cann be entirely ruled out; it is unlikely that intelligent life exists there, although even this is not a impossibility. The investigation of the planetary atmosphere showed: a) temperature on Ma ranges from 95° below zero to about 87° above, so the temperature scale covers the range of acti life; b) the atmospheric pressure at the surface of Mars may be 60 to 70 mm Hg, equivalent of th prevailing eleven miles above the surface of the Earth; c) the atmospheric density may be a quart that found at the summit of Mount Everest, and atmospheric pressure at the surface may be abo 10% that of the Earth's. *Subject Headings:* **1. Life on Mars 2. Martian climate.**—*E.K.*

12J–138 523.164.3

Radio signals from Mars. *Science*, Wash., D. C., 124(3223):620, Oct. 5, **1956. DLC**—U. Navy announced detection of first radio waves from Mars, picked up with a 600 in. radio telesco at National Research Lab. in Wash., D. C. (where first radio signals from Venus were detect earlier in 1956). Emissions indicate an average temperature of Mars of slightly below 32°F. T 3 cm signals were picked up on 2 nights in early Sept. 1956. (*Same item as* 9A–130, *Met. Ab Subject Headings:* **1. Temperature of Mars 2. Radio emission from Mars 3. Washington, D.** —*M.R.*

12J–139 523.43(0

†Wattenberg, Diedrich (*Director Archenhold-Sternwarte Berlin-Treptow*), **Mars der rote Plan** [Mars the red planet.] Leipzig, Urania-Verlag, **1956.** 195 p. 99 figs., 9 tables, bibliog. p. 187–1 **DLC** (QB641.W3)—An attempt has been made in this semitechnical work to bring together t voluminous literature of the planet Mars, and enable the reader to review the contemporary le of research in this field. Mythical aspects of the planet in the past and present, planetary discipli and Mars, phenomena observed, atmosphere, question of habitation, satellites of Mars, and brid between Mars and earth are discussed. As far as the atmosphere of this planet is concerned, it w D. Cassini, in 1672, who made the first reference to the existence of atmosphere on Mars with t introduction of Mars photography, violet light photos showed a larger disk, including the atmosphe than the red light ones. The height of the Martian atmosphere (190 km) has been calculated fr the difference of the two characters. Colored photos in 1945 revealed the Martian atmosphere to extremely transparent. Research of the composition of the atmosphere with spectra found carb dioxide (CO_2) the only component whose occurrence will be accepted as proven (G. P. Kuiper, 194 Observations based on the Doppler effect lead to the assumption of the existence of 6% oxygen a 16% water vapor. Theories to explain the comparatively large percentage of carbon dioxide presented. Other gaseous materials such as: ozone, carbon-monoxide, nitrogen oxide and nitro didn't show up in the spectra. The structure of the atmosphere; height of clouds, lapse rate temperature, and pressure are discussed. Weather conditions on Mars are more stable than Earth. V. G. Fesenkov compares the climate of this planet to a desert plane of the earth, situa at 18–20 km altitude, where the temperature is 30 to 40°C lower. *Subject Headings:* **1. Mart climate 2. Mars.**—*E.K.*

12J–140 523.43:57

Webb, Wells Alan, **Mars, the new frontier: Lowell's hypothesis.** San Francisco, Calif., Fea Pub., **1956.** 141 p. 8 figs., table, foot-refs. **DLC** (QB641.L905W4)—A highly readable anal of the network of canals on Mars. Evidence of life and its correlation with the Martian canal syst hypothetical history of Mars; Lowell's hypothesis, etc. are discussed. As far as atmosphere Mars is concerned, Lowell reported an atmospheric pressure of about 64 mm of mercury, a fig now generally accepted. Lowell further assumed the chemical composition of nitrogen, oxy

water vapor, and carbon dioxide. His hypothesis as to the existence of conditions on Mars suitable for plant life has been supported by GÉRARD DE VAUCOULEURS, W. H. WRIGHT, BROWN HARRISON and H. STRUGHOLD. On the other hand, his explanation of the canals as artificial constructions, has been largely rejected. *Subject Headings:* **1. Life on Mars 2. Martian canals.**—*E.K.*

1957

12J–141 523.43:551.54:551.510.41

de Vaucouleurs, Gérard (*Yale-Columbia Southern Station, Mt. Stromlo, Canberra*), **Sur la pression et la composition de l'atmosphère de Mars.** [Pressure and composition of the atmosphere of Mars.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:161–164, **1957.** 2 tables, 12 refs., eqs. **DLC, DWB** (P S678v)—Various data on Martian atmospheric pressure and composition from the latest photometric and polarimetric observations are reported. The atmospheric pressure on Martian ground level is estimated to be 70 to 100 mb which corresponds to the terrestrial atmospheric pressure at an altitude of 18±2 km. The most likely chemical composition of Martian atmosphere is 98.5% nitrogen, less than 0.1% oxygen and small amounts (1.2 to 0.25%) of argon and carbon dioxide. *Subject Headings:* **1. Martian atmospheric pressure 2. Martian atmospheric composition.** —*S. Nowinska.*

12J–142 523.43:522.61:778.38

de Vaucouleurs, Gérard (*Lowell Obs., Flagstaff, Ariz.*), **Photographic observations in 1956 of the blue clearing on Mars.** *Astronomical Society of the Pacific, San Francisco, Publications*, 69(411):530–532, Dec. **1957.** plate, 2 refs. **DLC** (QB1.A4)—A short series of photographic observations of Mars in blue light was secured at Mount Stromlo, Australia with the 26-inch photographic refractor of the Yale-Columbia Southern Station, principally in July, Aug. and Sept., 1956. Because of the limited time available for this program, the observations were mainly intended to help fill the longitude gap in the photographic patrol of Mars in blue light and, especially, to watch for a possible renewal of the "blue clearing" of the atmosphere near opposition. The equipment and film used are described briefly, and the results obtained are discussed. *Subject Headings:* **1. Photographic observations of Mars 2. Blue clearing on Mars.**—*Author's introduction & A.J.M.*

12J–143 523.43:551.571:551.574.1

Dollfus, Audouin (*Obs. of Meudon, France*), **La vapeur d'eau dans l'atmosphère de la planète Mars.** [Water vapor in the atmosphere of the planet Mars.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:165–168, **1957.** table, eqs. **DLC, DWB** (P S678v)—The existence of water vapor on Mars is considered to have been demonstrated by observations of infrared diffusion spectra of polar caps similar to those of ice; by polarization of light reflected from the polar caps; and by polarization curves of Martian clouds indicating a fog of ice crystals. The water content in the Martian air is estimated much weaker than on Earth. The weak quantity of water in the Martian atmosphere circulates constantly. Water evaporates from one polar cap, scatters toward the equator, is drifted afterwards to the opposite polar regions where it freezes to the ground. Thereupon the mechanism is repeated in the opposite direction. The yearly evolution of clouds seems to accompany the transfer of water vapor. *Subject Headings:* **1. Water vapor on Mars 2. Martian water transfer.**—*S. Nowinska.*

12J–144 523.43:535.24

Dollfus, Audouin, **Étude photométrique des contrées sombres de la surface de la planète Mars.** [Photometric study of the dark regions on the surface of the planet Mars.] *Académie des Sciences, Paris, Comptes Rendus*, 244(11):1458–1480, March 11, **1957. DLC.** Review in *Naturwissenschaftliche Rundschau*, Stuttgart, 11(4):148, **1958.**—The author has studied the dependence of the brightness of the so-called "seas" of Mars upon their distance from the margin of the planet's surface. A darkening of the margin decreasing with the wave length of light was noted. Martian air was found to contain fine particles since scattered light was greater than in a clear gaseous mixture. The brightness contrast between the bright "continents" and the dark "seas" diminishes from red towards violet. For the dark surfaces the scattering coefficient drops from 0.12 to 0.056. The visually observed green and blue colors of the "seas" are not real. The seasonal variation on the brightness of these surfaces may be explained by the development of micro-organisms. *Subject Headings:* **1. Martian surface features 2. Photometric observations of Mars.**—*I.L.D.*

12J–145 523.4:577.4

Fesenkov, V. G. (*Acad. of Sci., Moscow*), **La vie sur les planètes et la constitution de leur atmosphère primitive: rapport introductif.** [Life on the planets and constitution of their primitive atmosphere: introductory report.] *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:135–140,

1957. DLC, DWB (P S678v)—The writer does not believe in the possibility of life on the neighborin planets. He mentions, however, opinions by G. TIKHOV (U.S.S.R.) and others who had observe seasonal changes on Mars ascribed to vegetation. The existence of the Moon proves that the earl rotational movement of the Earth has been stronger and that many gases like hydrogen and ine gases have been dissipated into space. The molecular constitution of the atmosphere is determine by the mass of the planet and its conditions of formation, and may be modified by the presence of lif The atmosphere of Mars seems to consist of nitrogen with a small amount of argon and should n promote the existence of life. *Subject Headings:* **1. Life on planets 2. Planetary atmosphere 2. Martian atmospheric composition.**—*S. Nowinska.*

12J–146 551.510:523.4

Goody, R. M., **The atmosphere of Mars.** *Weather*, 12(1):3–15, Jan. **1957.** 2 figs., 2 plate 18 refs. Also: **The canal controversy.** *Ibid.*, p. 15. **DWB**—This general article usefully sum marizes recent work. The albedo of Mars is 0.148 (earth 0.39), equilibrium temperature 217° (245°K), general level of atmospheric temperature 30°K lower than earth. The year is nearly twi as long but the seasonal cycle is similar. The surface resembles a desert, with darker greenis areas. The seasonal polar caps are due to a few cm of ice-frost forming in spring from winter ice-mis The albedo of clouds is 0.4, possibly due to a cold form of ice (210°K). The "violet layer" is possibl dust haze, yellow clouds are dust, blue and white clouds—ice. Surface isotherms at local noo northern winter, are plotted. Winds at 10 km are 30–110 km/hr. Atmosphere is 0.2–0.25 massive as earth's, ground pressure about 85 mb. It is mainly nitrogen; there is little oxygen an water vapor, but about 15 times as much CO_2 as earth's. Vertical structure is shown compared wi earth, but the position of the tropopause is uncertain. The short article on **The canal controver** concludes that there are no canals but there are signs of primitive plant life. (*Same item as* 8.5–1 *Met. Abs.*) *Subject Headings:* **1. Atmospheric structure 2. Martian atmosphere.**—*C.E.P.B.*

12J–147 551.510:523.

Hess, Seymour L. (*Dept. of Met., Florida State Univ., Tallahassee and Lowell Obs., Flagsta Ariz.*), **The atmosphere of the planet Mars.** *New York Academy of Sciences, Transactions*, Ser. 19(4):352–357, Feb. **1957.** fig., 8 tables. **DLC**—Composition, temperature (map shows distributi in N. Hemisphere for winter), clouds, haze, general circulation and other characteristics of t Martian atmosphere are discussed. *Subject Headings:* **1. Planetary atmospheres 2. Marti atmosphere 3. Temperature of Mars.**—*M.R.*

12J–148 523.43:535.

Kiess, C. C.; Corliss, C. H.; Kiess, Harriet K. and Corliss, Edith L. R., **High-dispersion spect of Mars.** *Astrophysical Journal*, Chicago, 126(3):579–584, Nov. **1957.** 4 figs., refs. **Marti atmosphere restudied.** *U. S. National Bureau of Standards, Technical News Bulletin*, 42(3):48– March **1958.** figs., photos., table, refs. **DWB.** Further technical details *Astrophysical Journ* 126:579, Nov. **1957.**—In July 1956 a concave-grating spectrograph was set up at the Slope Observ tory of the U. S. Weather Bureau near the summit of Mauna Loa, Hawaii, for the purpose of pho graphing spectra of Mars with high dispersion. Several sets of spectrograms with spectra of t moon and Mars in juxtaposition were obtained with dispersions of 5 and 2 A/mm. The shift of t spectrum of Mars, due to the Doppler-Fizeau effect, was sufficient to separate Martian lines of and H_2O in the B and "a" bands from those of terrestrial origin. No such shifted lines were detecte After opposition, the spectrograph was set up again, at the Georgetown College Observatory, justed to cover the spectral range from 5,000 to 9,000 A. Again the results were negative. Obser tions at the National Bureau of Standards on the relative strengths of water-vapor bands are agreement with their calculated relative transition probabilities and show that the bands sou thus far in the spectrum of Mars are not the ones to use for this purpose. It is suggested that fut work be devoted to the bands of H_2O at 1.13 and 1.38μ. *Subject Headings:* **1. Martian spec 2. Spectroscopic observations of Mars 3. Mauna Loa, Hawaii.**—*Authors' abstract.*

12J–149 523.43:551.

Kozlova, K. I., **Obrabotka nabliudenii Marsa po risunkam, poluchennym G. A. Tikhovym 1918, 1920 i 1948 godakh.** [Analysis of Martian observations from sketches made by G. A. Tikh in 1918, 1920 and 1948.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 5:83–1 **1957.** 3 figs., 8 tables, numerous charts, 5 refs. **DLC** (QK1.A35866)—Visual observations of M made during three oppositions are discussed in detail. The observations included variations of polar caps, cloudiness (including cloud height), atmospheric transparency, etc. Cloudiness, and solid precipitation were found to be frequent phenomena; cloud bands extending through entire disk were often observed; atmospheric transparency underwent strong variations. *Sub Headings:* **1. Martian atmosphere 2. Visual observations of Mars.**—*G.T.*

12J–150 523.43

Kuiper, Gerard P. (*Yerkes and McDonald Obs.*), **Visual observations of Mars, 1956.** *Astrophysical Journal*, Chicago, 125(2):307–317, March **1957.** 4 figs., table, 4 refs. **DLC** (QB1.A9)—Visual observations of Mars are recorded, made with the 82-inch telescope during one month of nearly continuous observations, centered on the time of closest approach in 1956 (Sept. 7). Emphasis was placed on obtaining dependable determinations of the colors of the Martian dark areas and on the general appearance of the planet, including fine detail. The colors, expected to be green at this season (Martian spring), were found neutral gray, with a mere touch of moss-green in some of the equatorial regions and a touch of brown in the dark border surrounding the South Polar Cap. A spectacular system of dust storms was observed to develop, eventually enveloping the entire observable planet except the polar zones. Between Sept. 6 and 9 a dense cloud cap formed over the South Pole, which had cleared away on Sept. 14 and had deposited a new polar cap that has remained largely intact since. It is remarkable that this event occurred shortly before the summer solstice. The bearing of the surface studies on the vegetation hypothesis is discussed. *Subject Headings:* **1. Visual observations of Mars 2. Color of Mars.**—*Author's abstract.*

12J–151 523.43:551.510.4

Lebedinskiĭ, A. I. (*Moscow Univ.*), **Infrared molecular absorption in the atmosphere of Mars and the physical conditions on its surface.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 18:174–180, **1957.** 2 figs., 6 refs., 2 eqs. **DLC, DWB** (P S678v)—A formula for atmospheric temperature determination on Mars is worked out and, in so doing, the author indicates that Martian atmospheric processes are not similar to those on Earth. A discussion of water vapor and possible life on Mars in view of physical conditions there concludes the article. *Subject Headings:* **1. Martian atmosphere 2. Martian surface features.**—*A.J.M.*

12J–152 523.43:778.32:522.61

Richardson, Robert S. (*Mt. Wilson and Palomar Obs.*), **Preliminary report on observations of Mars made at Mt. Wilson in 1956.** *Astronomical Society of the Pacific, San Francisco, Publications*, 69(406):23–30, Feb. **1957.** table, 2 plates, 10 refs. **DLC** (QB1.A4)—After a brief reference to the types of observations made in the 1956 program, the author discusses visual and photographic observations of the disk, the high dispersion spectra of Mars, and briefly, the role that photographs of Martian satellites will play in determining the nature of the interior of Mars. Four excellent photos illustrate the discussion. *Subject Headings:* **1. Visual observations of Mars 2. Photographic observations of Mars.**—*A.J.M.*

12J–153 551.510.4:546.264:523.43 551.521.18:523.43

Shaw, J. H.; Burch, D. E. and Cummins, H. Z., **Near infrared spectrum of Mars.** Ohio. State Univ. Research Foundation Contract AF 19(604)-1003, Scientific Report, No. 8, Nov. **1957.** 17 p. 5 figs., table, 8 refs. **DWB** (M21.6 037s)—Infrared spectra of Mars were obtained in the autumn of 1956. From the intensity of the CO_2 bands near 1.6μ it has been estimated that the amount of CO_2 in the atmosphere of Mars is about four times greater than in the earth's atmosphere if the surface pressure is 100 mb and the atmosphere is mostly composed of nitrogen. This is compared with a Martian CO_2 abundance of 13 ± 4 times that of the earth's atmosphere obtained by GRANDJEAN and GOODY from the data of KUIPER. No evidence of bands of CO_2 (2.35μ) or N_2O (2.11, 2.26 and 3.94μ) was found, and upper limits of 50 atmo-cm have been placed on these gases. On one spectrum, indications of an absorption at 3.5μ were obtained, in agreement with the results of SINTON. However, the detector failed before confirmatory spectra could be obtained. (*Same item in* 9.11–146, *Met. Abs.*) *Subject Headings:* **1. Infrared spectra of Mars 2. Carbon dioxide in the atmosphere of Mars 3. Mars.**—*Authors' abstract.*

12J–154 523.43:523.035.3

Sinton, William M. (*Smithsonian Astrophysical Obs.*), **Spectroscopic evidence for vegetation on Mars.** *Astrophysical Journal*, Chicago, 126(2):231–239, Sept. **1957.** 4 figs., 2 tables, 8 refs., 2 eqs. Also in: *Astronomical Society of the Pacific, San Francisco, Publications*, 70(412):50–56, Feb. **1958.** figs., photo., 10 refs. **DLC**—A new test for the presence of vegetation on Mars depends on the fact that all organic molecules have absorption bands in the vicinity of 3.4μ. These bands have been studied in the reflection spectrum of terrestrial plants, and it is found that for most plants a doublet band appears which has a separation of about 0.1μ and is centered about 3.46μ. Spectra of Mars taken during the 1956 opposition indicate the probable presence of this band. This evidence and the well-known seasonal changes of the dark areas make it extremely probable that vegetation in some form is present. *Subject Headings:* **1. Life on Mars 2. Spectral reflectivity of Mars.**—*Author's abstract.*

12J–155 523.43:551.593.6

†Teĭfel', V. G., **Serebristye oblaka.** [Noctilucent clouds.] *Akademiia Nauk Kazakhskoĭ SS Sektor Astrobotaniki, Trudy*, 5:59–82, **1957.** 8 figs., 13 tables, 32 refs., 8 eqs. **DLC** (QK1.A35866) This article is a comprehensive review of existing knowledge on noctilucent clouds. After a br history of research on this subject, the morphological properties of noctilucent clouds, their ori and optical characteristics are taken up in turn. Finally, a comparison is made between noctiluc clouds in the Earth's atmosphere and clouds in the atmosphere of Mars. The various forms un which Martian clouds appear and the possible physical structure of such clouds are briefly discuss *Subject Headings:* **1. Noctilucent clouds 2. Martian clouds.**—*G.T.*

12J–156 523.43:57

†Webb, Wells Alan, **On the rejection of the Martian canal hypothesis.** *Scientific Mont* Wash., D. C., 85(1):23–28, July **1957.** 2 figs., 30 refs. **DWB, DLC**—The author reviews briefly controversy on the reality of the Martian canals and examines the question whether the reject of the Martian canal hypothesis in accordance with the 1909 arguments of Hale and his associa agrees with current scientific evidence. An outline is presented of communication network the which proves statistically that civilized continents of the earth are covered with lines that resembl their disposition the Martian canals. Network patterns where a preponderance of the rays is from four or more points are associated with human intelligent action; the Martian canals hav similar pattern. Suggestions for objective reliable observations of the Martian canals are sugges *Subject Headings:* **1. Martian canals 2. Life on Mars.**—*I.L.D.*

12J–157 523.43:5

Wilkins, Hugh Percival (*Pres., International Lunar Society, London*), **The mystery of M** *Smithsonian Institution, Annual Report*, 1956, issued **1957.** p. 229–244. photos. **DLC** (Q11.S6 This paper, written in popular style, brings together in an interesting manner all the scien knowledge, observations and speculations, that man has about Mars. Among others the pa presents a delightful discussion of the canals on Mars, first observed by Signor Schiaparelli in It and of the fascinating theories of Professor Lowell, assuming the existence of intelligent life on planet. Although in sympathy with Professor Lowell's ideas, the paper confines itself to scie ically valid facts, concluding that the only thing which science has established is the almost cer existence of plant life on Mars, and the possibility that some form of animal life may also e *Subject Headings:* **1. Mars 2. Life on Mars.**—*I.S.*

1958

12J–158 551.583:523.74:52

Bartha, Lajos, Jr., **Zusammenhang zwischen der Witterung des Planeten Mars und der nentätigkeit.** [Relation between the weather of Mars and solar activity.] *Időjárás*, Buda 62(3):166–168, May/June **1958.** fig., table, 6 refs. **DLC**—Variations of the Martian snow (1781–1956) show good correlation with ice sheet variations in the Arctic Ocean and with activity. This would appear to indicate that Mars has magnetic poles of the same order as the ea it also shows climatic variations on the earth and Mars to have a common origin in solar acti *Subject Headings:* **1. Martian climatic variations—solar activity relationships 2. Climatic varia 3. Mars' magnetic pole 4. Mars.**—*G.T.*

12J–159 523.43:551.

Bronshten, V. A., **Vizual'nye nabliudeniia Marsa vo vremia velikogo protivostoianiia 19** [Visual observations of Mars during the major opposition of 1956.] *Vsesoiuznoe Astron Geodezicheskoe Obshchestvo, Biulleten'*, No. 22(29):3–11, **1958.** 5 figs., 3 tables, 9 refs. **D** Visual and photographic observations of Mars were made in Aug. and Sept. 1956 at the Stalin planetarium. Details of observed polar cap variations, anomalous phenomena, atmospheric bidity, intensity and color of maria, etc., are reported and shown in tables, graphs, drawing photographs. The most interesting phenomenon observed on Mars in 1956 was the appearan white spots in the southern hemisphere of the planet at the end of August. This, and other nomena observed appear to indicate large-scale cyclonic movements in the Martian atmos which led to snowfall extending throughout the regions Argyre I to Noachis, and caused dust st which eventually darkened the entire southern hemisphere of Mars. It is for the first time author claims, that such a process has been observed in all its complexity. The disturbance have been related to the intense sunspot activity observed at that time. *Subject Headings:* **1. V observations of Mars 2. Martian atmosphere 3. Martian opposition, 1956.**—*G.T.*

12J–160 523.43:535.24

Butslov, M. M.; Kaliniak, A. A. and Kamionko, L. A., **Rezul'taty fotometricheskoĭ obrabotki snimkov Marsa, poluchennykh v blizkoĭ infrakrasnoĭ oblasti spektra.** [Results of the photometric reduction of photographs of Mars obtained in the near infrared spectral region.] *Pulkovo. Glavnaia Astronomicheskaia Observatoriia, Izvestiia*, 21(3):63–71, **1958.** 3 figs., 4 tables, 4 refs. English summary p. 71. **DLC**—Some photometric results obtained during the opposition of Mars in 1956 are discussed. The absolute values of brightness of Mars expressed in units of solar brightness for the equivalent wavelengths of 0.840 and 0.983μ are found to be $1.11 \cdot 10^{-6}$ and $1.45 \cdot 10^{-6}$ respectively. The rate of change of brightness of Mars with wavelength, as well as of the Moon, is in good agreement with values determined earlier by G. P. KUIPER for the same spectral region. The brightness of scattered light due only to the hazy conditions in the atmosphere of Mars can be estimated as being as large as about 20% of the whole apparent brightness of the planet. *Subject Headings:* **1. Brightness of Mars 2. Photometric observations of Mars.**—*Authors' abstract.*

12J–161 523.43:577.4

Dollfus, Audouin (*Meudon Obs., France*), **Nature of the surface of Mars.** *Astronomical Society of the Pacific, San Francisco, Publications*, 70(412):56–64, Feb. **1958.** 4 figs., 2 photos, 6 refs. **DLC** (QB1.A4)—The permanent large bright areas of the Martian surface are spotted with dark markings. These dark regions show changes in shape, contrast, and color, the alterations being both seasonal and sporadic. These changes have led many astronomers to assume the existence on Mars of complicated chemical agents such as live organisms. Polarimetric and photometric studies of the dark and bright regions of Mars give new information about the nature and changes of its surface. The author discusses briefly the nature of polarimetric and photometric studies and the types of information each study can reveal (e.g., smooth or rough surface; granular surface, etc.). The nature of the bright and dark areas of Mars is described; the article concludes with a discussion of the morphology of animated organisms. *Subject Headings:* **1. Martian surface features 2. Life on Mars.**—*Author's introduction and A.J.M.*

12J–162 523.43:535.24:551.593.7

Focas, Jean H., **Etude polarimétrique et photométrique de la calotte polaire et des régions sombres de la planète Mars.** [Polarimetric and photometric study of the polar caps and of the dark regions of the planet Mars.] *Académie des Sciences, Paris, Comptes Rendus*, 246(11):1665–1667, March 17, **1958.** table, 6 refs. **DLC**—The polarization of light at different regions of the planet Mars were measured from Pic-du-Midi in 1954 and 1956 as well as from the Observatory of Athens. The contrast of circumpolar and temperate Martian spots showed stronger seasonal variations than those of the equatorial regions and of those propagating from the poles toward the equator at the end of spring at a velocity of 36 km per hour, as determined at Meudon Observatory. The glare of polar crust is 1.3 times that of the clouds covering it in winter. The analysis is described for the southern polar cap, the dark regions, the northern and southern regions, the equatorial regions and some special areas. The variation of the glare of the southern polar cap and the curve of polarization are illustrated. Maximum and minimum values of polarization between $-65°$ and $+45°$ latitude are presented in a table. *Subject Headings:* **1. Martian surface features 2. Photometric observation of Mars 3. Polarization measurements of Mars 4. Paris, Meudon Observatory, France.**—*O.T.*

12J–163 523.43:535.24

Glagolevskiĭ, Iu. V. and Kozlova, K. I., **Fotometriia uchastkov poverkhnosti Marsa v 1956 godu na elektrofotometre AFM-3.** [Photometry of areas of the Martian surface in 1956 with the AFM-3 electrophotometer.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 6:197–207, **1958.** 5 figs., 8 tables, 11 refs., 2 eqs. **DLC** (QK1.A35866)—Results of photoelectric measurements of various portions of Mars during the 1956 opposition are reported. Data on brightness, color index and albedo are presented, and the optical thickness of the Martian atmosphere is derived (Oct. 8–9, 1956). There was found to be little contrast between maria and continents, due to the considerable dust content of the Martian atmosphere. *Subject Headings:* **1. Martian surface features 2. Photometric observation of Mars 3. Martian opposition, 1956.**—*G.T.*

12J–164 523.43:577.4

Golosnitskiĭ, L. P., **K voprosu o fizicheskikh usloviiakh i vozmozhnosti zhizni na Marse.** [Physical conditions and possibilities of life on Mars.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 21(28):3–13, **1958.** 16 refs., 3 eqs. **DLC**—Some questions on the possibilities of life on Mars, which were found to have been incorrectly answered by V. G. FESENKOV, are discussed. The absence of water as seen by Fesenkov in the invisibility of watersheds, in the great thinness of the polar caps, in absence of precipitation and in the nature of channels considered to be surface formations, is denied by N. P. BARABASHOV (*see item* 12J–100, this biblio.) and by

N. N. Sytinskaia (Izvestiia AN Kaz. SSR, No. 90, 1950) who consider the channels a vast irrigatio network of large vegetation areas fed during the summer by the melting thick polar caps. Althoug life conditions on Mars have been more advantageous a billion years ago, the water abundanc higher, the air denser, the temperature milder, the life on Mars should have assimilated itself t more difficult circumstances. If we applied the formula derived by Fesenkov of "the factor of li activity" for Mars to the albedo and temperature of a terrestrial desert area covered by cactuse the result would be zero, as Fesenkov has obtained for Mars. It is inferred that Fesenkov's viev points and formulas do not satisfactorily solve the problem of life and vegetation existence on Mar *Subject Heading:* **1. Life on Mars.**—*S. Nowinska.*

12J–165 523.43:577

Heintz, W. D. (*Universitäts-Sternwarte, München*), **Rätsel des Mars, II, Leben oder nicht? Wa sind die Marskanäle? Klima und Wettervorgänge.** [Riddle of Mars, Pt. 2, Life or not? Wha are the Martian canals? Climate and weather processes.] *Die Umschau*, 58(10):289–291, Ma 15, **1958.** fig., 5 foot-refs. **DWB, DLC**—The author summarizes present knowledge on the possibi presence of vegetation on Mars, volcanism as a possible cause of many dark spots, the nature of th Martian canals and weather and climate on Mars. The areas of Mars are covered by dust simila to that present on the moon; the infrared spectrum is that obtained from orthoelastic minerals. Th dark areas are not those of vegetation since water vapor and the infrared spectrum characterist of chlorophyll were lacking. Higher plant life is excluded because of absence of oxygen; possibl mosses may be present. The Martian canals are apparently resolvable into more or less irregull spots showing a seasonal variability. Martian temperatures obtained by radiometric analysis yie mean values below freezing; −10°C to −20°C at the equator and −70°C at the poles. The diurn temperature amplitude is more than 50°C and the annual amplitude is 50°C at the equator an 100°C at the poles. The rarefied Mars atmosphere may be a simplified model of the earth's atmo phere. Clouds in the form of small white spots are visible on the western edge of Mars; these do n rotate with the surface of the planet. Other cloud fields from deeper strata rotate with the plane sometimes these clouds are yellowish; they move across the surface of the planet at a rate of km/hr. Also "blue clouds" are observed; these photograph only in shortwave light as white spo *Subject Headings:* **1. Life on Mars 2. Martian canals.**—*I.L.D.*

12J–166 551.593.54:523.

Hess, Seymour L. (*Fla. State Univ. & Lowell Observatory*), **Blue haze and the vertical structu of the Martian atmosphere.** *Astrophysical Journal*, Chicago, 127(3):743–750, May **1958.** 2 fig table, 10 refs., 3 eqs. Also: **Comment** by Harold C. Urey, *Ibid.*, 128(3):736–737, Nov. **1958.** (F abstract on this title from another source, *see* 8.10–286, Oct. 1957, *MAB.*) **DWB, DLC**—T atmospheric haze which usually obscures the surface of Mars in blue light is probably a condensa rather than a dust because it can clear away rapidly. Carbon dioxide and water vapor are bo present in the atmosphere, and condensation of each into the solid phase has been suggested explain the blue haze. Calculations are carried out by assuming a convective atmosphere with surface temperature of +10°C for the subsolar point and a lapse rate of 3.7°C/km. When t optical properties of clouds produced in such an atmosphere are determined with the aid of the M theory of scattering, it is found that (1) carbon dioxide ice clouds are far too opaque to be the cau of the blue haze; (2) water ice clouds can cause the modern attempts to detect water vapor spect scopically in the Martian atmosphere, since the total precipitable water content corresponding such a frost point is only 2μ. These results indicate that the author's earlier suggestion of carb dioxide ice clouds should be rejected. UREY comments on S. L. HESS's article. He states that t blue haze cannot be due to scattering of blue light by fine ice crystals at an altitude of 30 km sin no water bands have been reported in the blue haze, uniform conditions of temperature a temperature change over the whole of Mars are unlikely, and the blue haze cannot come down to t surface at the pole as HESS postulates, since the blue image is elongated (not flattened) at the pol whereas the red image is flattened at the poles. UREY suggests fluorescing molecules produced solar radiation as origin. *Subject Headings:* **1. Blue haze on Mars 2. Martian atmosphere 3. M scattering.**—*Author's abstract and M.R.*

12J–167 523.43:551.51

Kozlova, K. I. and Glagolevskiĭ, Iu. V., **Vizual'nye nabliudeniia Marsa vo vremia ego velik protivostoianiia 1956 goda.** [Visual observations of Mars during its great opposition in 195 *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 6:7–22, **1958.** fig., 8 tables, 5 re Also: Kutyreva, A. P., **Nekotorye dannye vizual'nykh nabliudenii Marsa v 1956 godu.** [Some d from visual observations of Mars in 1956.] *Ibid.*, p. 23–33. 3 figs., 9 refs. **DLC**—Visual obser tions of Mars made at Alma-Ata from July to Oct. 1956 are reported. A mirror-lense telescope wit mirror diameter of 213 mm and a focal distance of 2 m was used without filter and with red, yell

reen or blue filter. Technical details of each observation are listed. The results reported include abulated data on the visibility of various Martian formations, extensive diary entries on the observa-ions, and descriptions of the main events. Twelve photographs taken with and without filters are ncluded. Outstanding among the phenomena observed was a bright ring visible all around the Martian disk, apparently due to dust transported into the Martian atmosphere by a storm. Varia-ions of this ring are discussed as evidence of strong atmospheric activity on Mars. *Subject Headings:* **1. Visual observations of Mars 2. Martian atmosphere 3. Martian opposition, 1956.**—*G.T.*

12J–168 523.43

Kozyrev, N. A., **O nekotorykh svoĭstvakh atmosfery Marsa po spektrofotometricheskim nabliudeniiam 1956 goda.** [Some properties of the atmosphere of Mars according to spectrophoto-metric observations in 1956.] *Akademiia Nauk SSSR. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia*, 18:61–65, **1958.** 2 figs., ref., 3 eqs. English summary p. 61. **DLC**—In 1956 a sharp decrease was observed in the contrast of the details on the surface of Mars, while the general color of the planet changed but little. The author concludes that the atmosphere of the planet became hazy only in the very lowest layers and that there were no essential changes in the general optical properties of the atmosphere itself. Spectrograms of the polar caps, made in the second half of September and at the beginning of Oct., showed that the polar cap is an atmospheric formation formed by the condensation of the particles that cause the unusual scattering in the upper layers of the planet's atmosphere. *Subject Headings:* **1. Martian atmosphere 2. Spectrophotometric observa-tions of Mars 3. Martian opposition, 1956.**—*Author's abstract.*

12J–169 523.43

*Mottoni, Glauco de, **Osservazioni del pianeta Marte nel 1954.** [Observations of the planet Mars in 1954.] *Milan. Osservatorio Astronomico di Milano-Merate, Publicazioni*, n.s., No. 11:173–197, **1958.** plate (colored), 11 tables, 6 foot-refs. **DLC**—This publication contains data gathered from 31 direct observations of Mars conducted in Genoa from May 9 to Sept. 5, 1954. Although the planet was relatively close to Earth during that period, both poles of Mars remained entirely or partially invisible. Only the last three observations furnished some data on the north polar cap. Unfavorable atmospheric conditions over Genoa added to the difficulties of observation. Aside from a simple enumeration of data under each observation, the publication contains short discussions of some particular phenomena observed in the following areas: polar regions, bright zones, surface formations in the northern temperate zone, equatorial and southern temperate zones. A page con-taining six photographs of Mars in full color is appended. *Subject Headings:* **1. Martian observations 2. Genoa, Italy.**—*I. U. Chung.*

12J–170 523.43

Sadil, Josef, **Nové vyzkumy Marsu.** [Recent research on Mars.] *Říše Hvězd*, Prague, 39(7): 145–152, **1958.** 4 figs., foot-refs. **DLC**—On the basis of recent work of Barabashov, Fesenkov, Kozyrev, Lebedinskiĭ, Sharonov (all U.S.S.R.), Dollfus (France), Kuiper, McLaughlin, Richardson, Urey (all U. S.), de Vaucouleurs (Australia) and others, the author reviews the results of research on Martian atmospheric phenomena (pressure, tropopause height, moisture exchange and temperature) and the possibility of life on Mars. Some of the observations made during the 1956 opposition are mentioned. As a working hypothesis the author suggests that the Martian maria are lava fields partially covered with some very hardy form of vegetation. *Subject Headings:* **1. Life on Mars 2. Martian opposition, 1956 3. Martian atmosphere.**—*G.T.*

12J–171 523.43:523.035.313

Stanko, S. A., **O vliianii spektra otrazheniia marsianskoĭ pochvy na spektr otrazheniia ego rastitel'nosti.** [Effect of the reflection spectrum of Martian soil on the reflection spectrum of its vegetation.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 6:55–64, **1958.** 9 figs., 2 tables, 14 refs. **DLC** (QK1.A35866)—Measurements of spectral reflectivity were made in the southern Kara Kum desert, Turkmen SSR. Curves showing reflectivities of different desert plants at wave lengths from 300 to 750 mμ are presented along with similar curves for bare soil. Data on meteorological conditions (approximating those on Mars) and soil type are also given. It is found that spectral reflectivity values obtained of desert plants from above are dominated by reflectivities of the soil, due to the thinness of the growth of such plants. This may explain the absence of the absorption spectrum of chlorophyl in light reflected from Martian maria. *Subject Headings:* **1. Spectral reflectivity of Mars 2. Martian spectra 3. Kara Kum desert, Turkmen S.S.R.**—*G.T.*

12J–172 523.43

Tikhov, G. A., **Predvaritel'nye rezul'taty nabliudenii Marsa v Sektore astrobotaniki v period velikogo protivostoianiia 1956 goda.** [Preliminary results of observations of Mars by the Depart-

ment of Astrobotany during the great opposition in 1956.] *Akademiia Nauk Kazakhskoĭ SS Sektor Astrobotaniki, Trudy*, 6:3–6, **1958. DLC** (QK1.A35866)—Observations of Mars were ma at Alma-Ata during its opposition July–Oct. 1956, by 1) visual observation through color filte 2) photography with light filters; 3) spectrophotography; and 4) photoelectric observation. As t photographic observations require some time for analysis, only results of the visual observatio are described. The phenomena observed include variations of the south polar cap, development subpolar vegetation, occurrence of snow or rime in the southern hemisphere on Aug. 26, a sto which obscured the atmosphere in the polar, subpolar and moderate latitudes of the southern he sphere with dust for a month, etc. Plans for the purchase of a new, larger telescope for futu planetary observations are announced. *Subject Headings:* **1. Martian observations 2. Marti opposition, 1956 3. Alma-Ata, Kasakh S.S.R.**—*G.T.*

12J–173 523

Vladimirskiĭ, B. M. and Liubarskiĭ, K. A., **K voprosu o prirode poverkhnosti Marsa.** [Probl of the nature of the surface of Mars.] *Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotan Trudy*, 6:34–38, **1958.** 3 figs., 9 refs. **DLC** (QK1.A35866)—This is a critical note on the book **L in the Universe** by OPARIN and FESENKOV (*see item* 12I–65, *Met. Abs.*). FESENKOV is criticized adopting MCLAUGHLIN'S hypothesis (*see item* 12J–108, this biblio.) in which different colors on surface of Mars are explained by the presence of volcanic material. The quiet surface of M contradicts this hypothesis. Another principal feature of MCLAUGHLIN'S theory is the coincide of Martian winds with contours of the maria. It is contended that this coincidence is purely fictiti as it was derived with considerable bias in the use of Martian circulation data. The authors pres their own analysis of the directional distribution of canals with latitude and conclude that th nature cannot be explained by any simple hypothesis. *Subject Headings:* **1. Martian surface featu 2. Life on planets.**—*G.T.*

12J–174 523.43:523.035.3:57

Vladimirskiĭ, B. M. and Liubarskiĭ, K. A., **K kritike gipotezy o sushchestvovanii rastitel'nost Marse.** [Critique of the hypothesis of the existence of vegetation on Mars.] *Akademiia N Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy*, 6:43–54, **1958.** 3 figs., 4 tables, 56 refs. **L** (QK1.A35866)—After refuting some of V. G. FESENKOV'S arguments and reasserting the existe of plant cover on Mars, the author reviews existing knowledge on radiation conditions on Mars the chemical composition of its atmosphere and hydrosphere and discusses the reactions invol in the process of photosynthesis on the planet. Considering the amounts of CO_2 and O_2 on M it is suggested that photosynthesis by plants is almost certainly responsible for the present pau of water on the planet. *Subject Headings:* **1. Life on Mars 2. Martian environment.**—*G.T.*

12J–175 523.43:535.33:551.5

Wilson, A. G., **Spectrographic observations of the blue haze in the atmosphere of Mars.** *R Corporation, Santa Monica, Calif., Paper* 1509, Oct. 6, **1958.** 7 p. table, 2 refs., eq. **DWB** (M ((R186p)—The author discusses the nature and observation of Martian blue haze; presents form for singling out the blue haze phenomena from lunar reflectivity and extinction, solar spectrum the earth's atmospheric extinction; and also presents the possibility of an "Earth blue haze" wi suggestion for detecting such a phenomenon. *Subject Headings.* **1. Spectrographic observation Mars 2. Blue haze on Mars 3. Martian atmosphere.**—*A.J.M.*

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12J–176 523.43:551.510.4:523.0

Barabashov, N. P. and Koval', I. K., **Pro rozpodil iaskravosti v "moriakh" Marsa.** [tribution of brightness in Martian "seas."] *Akademiia Nauk URSR, Kiev, Dopovidi*, No. 2: 155, **1959.** fig., 5 refs., eq. Russian and English summaries p. 155. **DLC**—Measurements of brightness of "seas" and "continents" of Mars and the contrast between the "seas" and "contine during its last opposition, made in the infrared portion of the spectrum at various distances from center of the planet's image, indicate different values of the smoothness factor, which is in disa ment with these advanced by V. G. FESENKOV. *Subject Headings:* **1. Brightness of Mars 2. Ma atmosphere.**—*Authors' abstract.* Ⓢ

12J–177 52

Barabashov, N. P., **Novoe v izuchenii Marsa.** [Recent studies of Mars.] *Priroda*, Mos No. 6:13–18, June **1959.** 6 figs. **DWB, DLC**—The author gives a detailed account of the re of recent astronomic studies of Mars during the last great opposition of the planet in 1956 as obta by the Soviet observatories of Kharkov, Tashkent, Abastumani, Crimea and Kazakh, by mea photographic, spectroscopic, astrographic and telescopic observations. It has been found

appreciable changes take place sometimes both in the atmosphere and on the surface of the planet. (*Same item as* 11.7–122, *Met. Abs.*) *Subject Headings:* **1. Mars 2. U.S.S.R.**—*A.M.P.*

12J–178 523.43:778.32

de Vaucouleurs, Gérard (*Harvard College Observatory*), **Observations of Mars in 1958.** *Sky and Telescope*, N. Y., 18(9):484–489, July **1959.** fig., photos., 15 refs. **DWB, DLC**—During recent years, the world has shown increasing interest in space problems. In this article some observations of Mars in 1958 are described. The observations show the dark area around longitude 250°, latitude +25° still visible. The blank desert region between longitudes 100° and 180° was carefully scrutinized. The canal phenomenon is specifically a Martian phenomenon. Many photographs are included in the article. *Subject Heading:* **1. Martian observations.**—*A.H.K.* Ⓢ

12J–179 523.43:535.24

de Vaucouleurs, G. (*Harvard College Obs., Cambridge*), **Multicolor photometry of Mars in 1958.** *Planetary and Space Science*, N. Y., 2(1):26–32, Oct. **1959.** 6 figs., 7 tables, 9 refs., eqs. **DWB**—Photoelectric observations of Mars in Oct. and Nov. 1958 at the Lowell Observatory give values of the stellar magnitude and integral albedo at five wave lengths from $\lambda 3300$ to $\lambda 6900$. In the near ultraviolet $3000 < \lambda < 4000$ Mars is "grey" and very dark, with a nearly constant albedo $A = 0.046$. Earlier Mount Stromlo and Flagstaff data are also discussed. (*Same item as* 11.9–85, *Met. Abs.*) *Subject Headings:* **1. Photoelectric observation of Mars 2. Albedo of Mars 3. Mars 4. Flagstaff, Ariz.**—*Author's abstract.*

12J–180 523.43:535.24

Focas, Jean H., **Etude photométrique de la variation saisonnière de la brillance des régions sombres de la planète Mars.** [Photometric study of the seasonal variation of the brilliance of the regions of the planet Mars.] *Académie des Sciences, Paris, Comptes Rendus*, 248(7):924–926, Feb. 16, **1959.** 3 figs., 9 refs. **DLC**—The movement of the dark regions of the Martian surface takes place from the poles toward the equator in seasonal moves. The speed is calculated to be 35 km a day. The amplitude of the darkening diminishes and terminates toward 22° on the opposite hemisphere. A lag of 180 days has been observed between the beginning and the peak of darkening. *Subject Headings:* **1. Brightness of Mars 2. Photometric observations of Mars.**—*E.K.* Ⓢ

12J–181 523.43:577.4

Guérin, Pierre, **Recherches nouvelles sur Mars.** [New research on Mars.] *Nature*, Paris, No. 3296:526–531, Dec. **1959.** 7 figs. **DLC**—Shklovskiĭ's assertion of May 1959 on the artificiality of Martian satellites leads to the review of the probable causes of the extraordinary angular acceleration of the satellite Phobos. The scarce calculi, the omission of a consideration of probably quite unusual friction and magnetism are against Shklovskiĭ's supposed launching of the satellites by Martian people two billion years ago. Mars and its two satellites are illustrated by a picture based on G. FOURNIER'S observation at Jarry-Desloges, Sétit. The structure and physical nature of the Martian dark spots was proved by SINTON at Harvard definitely in 1958 as a material formed by organic hydrocarbon molecules. The description of the SINTON test illustrated by designs of the disk of Mars in 1941 and 1958 and of different spectrograms represents the strongest evidence as yet of the existence of life on Mars by the presence of hydrocarbons. *Subject Headings:* **1. Mars 2. Life on Mars.**—*O.T.* Ⓢ

12J–182 523.43

Jansen, A. G., **Nederlandse waarnemingen van Mars in 1958.** [Observations in the Netherlands of Mars during 1958.] *De Meteoor*, Utrecht, 15(3):34–39, June **1959.** 6 figs.—During 1958 several observations of Mars were made in the Netherlands. A. MAK, at Sneek, made seven drawings with a 4-inch refractor (with 3 layers of wire-gauze partially covering the objective) of which four are shown. A composite map based on observations is also given. The author worked at Leyden Observatory with a 6-inch refractor; from 8 observations (six of which are shown) he made a map. The assumed zero-meridian differs some 55 or 60 degrees from the normally accepted value. *Subject Headings:* **1. Martian observations 2. Martian atmosphere 3. Leyden, Netherlands.**—*A.V.* Ⓢ

12J–183 523.43

†Katterfel'd, G. N., **K voprosu o tektonicheskom proiskhozhdenii lineĭnykh obrazovaniĭ Marsa.** [Tectonic origin of the linear formations on Mars.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 91(3):272–283, May/June **1959.** 5 figs., 5 tables, 30 refs. **DLC**—An analysis of the statistics of the Martian "canals" and their azimuthal distribution reveals that they are more numerous in the southern than in the Northern Hemisphere. This corresponds to the greater

number of "oases" in the Southern Hemisphere and to the greater area of the marine submerge of the southern half of Mars. Hence the canals appear to be associated with the cases not o locally but also genetically. In the Northern Hemisphere a north-east concentration of the can predominate while in the Southern Hemisphere a south-east one predominates. In both hemisphe the canals inclining to the east are more than 1½ times more numerous than those inclining to west. An examination of the fractures and fissures on the surface of the moon indicates that both hemispheres meridional fractures predominate over latitudinal ones and in the diagonal syst of the Northern Hemisphere north-east directions are more frequent while in the Southern He sphere the south-east direction prevails over the south-west. The lunar fractures indicate presence of a mobile and plastic subcone layer deforming the solid outer envelope as a result of ti and rotational action; and the process of fracturing is associated with mountain formation. Martian "canals" resemble the African rift valley. The arid nature of the Martian surface and probable absence of extensive sedimentary deposits favor more plastic rocks on the surface of planet and hence a straight line axial extension of fractures in contrast to crustal deformation ch acteristics of the earth. The prevailing direction of linear structure of Mars corresponds to figure and the position of the axis of rotation of the planet. This also indicates the endogen origin of the "canals." The "canals" are zones of tectonic rifts nourishing plant zones and "oas with tectogenic deep waters. On the basis of an analysis analogous to the origin of tectonic fract on the surface of the earth, of the azimuthal statistics of "canals" of Mars and of the roses of fractures of Mars and of the moon it is concluded that the tectonic origin of the "canals" of Ma associated with the variable total compression and is determined by the uneven rotation of the pla and the lines and oases can be regarded as centers of tectonic deformation. The distribution of centers of deformation on the surface of Mars is determined by pulsations of the form of the pla accompanied by its uneven rotation. The "oceanicity" of the Southern Hemisphere and the traction of the Martian "seas" from north to south is homologous to the oceanicity of the south hemisphere and contraction of the continents of the Earth to the south and have the same gen cause—the asymmetric figure of the planet relative to the plane of the equator. The tect character of the planet is associated with its unequal gravitational compression and rotation. (*S item as* 11.9–86, *Met. Abs.*) *Subject Heading:* **1. Martian canals.**—*I.L.D.*

12J–184 52

Koval', I. K., **O stepeni gladkosti materikov i moreĭ Marsa.** [Degree of smoothness of tinents and maria on Mars.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia,* 1:85–92, **1959.** 16 figs., 4 refs. **DLC**—Variations of contrast between maria and continents f the center to the periphery of Martian pictures obtained through infrared and red filters are anal as well as points of maximum brightness on the intensity equator for continents and maria at va values of the planet's phase angle. It is found that the contrast decreases toward the perip and that the points of maximum brightness for continents do not coincide with those for the m This confirms the author's earlier finding that different laws of light reflection apply to Ma continents and maria. *Subject Heading:* **1. Martian surface features.**—*Transl. of author's abstra*

12J–185 523.43:53

Kozlova, K. I. and Glagolevskiĭ, Iu. V. (*Sektor Astrobotaniki, AN KazSSR*), **Ob izmenenii ts Marsa po fotoelektricheskim nabliudeniiam 1958 g.** [Color changes on Mars according to pl electric observations in 1958.] *Astronomicheskiĭ Tsirkuliar*, Moscow, No. 201:4–6, April 15, table, 5 refs., 2 eqs. **DLC**—Observations of Mars were made in Alma-Ata in 1958 during a p of opposition with a telescope (AZT-7) and with an electrophotometer (AFM-3). The maxi diameter of the Martian image was only 0.925 mm. Observation and recording were made thr blue and yellow filters and in comparison with the star (α Aur). Mars and the star had the zenith distances during the observations. The color excess (CE_M) and color index (CI_M) were d mined with a given formula. The results obtained during 1956 and 1958 are tabulated for day and discussed in the text. *Subject Headings:* **1. Martian color changes 2. Photoelectri servations of Mars 3. Alma-Ata, Kazakh S.S.R.**—*N.P.S.* Ⓢ

12J–186 523.

Popov, V. S., **O priznakakh zhizni na planetakh.** [Signs of life on the planets.] *Pr* Moscow, No. 11:89–90, Nov. **1959.** fig. **DLC**—Spectrographic studies of Mars both in the v and infrared regions of the spectrum indicate that there are no green plants identical with thc the earth. G. A. Tikhov, however, maintains that owing to different environmental conditio Mars the plant life would be different from that on the surface of the earth. Karatinoid pig with absorption bands between wave lengths 0.4–0.5μ are observed in the region of maximum e distribution at the bottom of the Martian atmosphere. Data on the spectral properties o Martian "seas" indicate strong absorption of long wave lengths (up to 0.5μ) but the fundam

chlorophyl absorption band has not been found. The differences in spectral reflection between Martian "Seas" and terrestrial vegetation can be explained by the characteristics of the Martian climate. The spectrum of Mars shows an absorption band at the wave length of the absorption band of the C-H molecule. From this follows that Mars possesses organic molecules that are not covered by dust and are decomposed by UV radiation of the sun. It is natural to assume that they possess the capacity of reconstitution. (*Same item as* 11.10–102, *Met. Abs.*) *Subject Headings:* **1. Planetary vegetation 2. Martian atmosphere 3. Life on Mars.**—*I.L.D.*

12J–187 523.43:551.510.41:546.26

Rosen, Boris, **Remarques concernant le rôle possible des poussières carboniques dans les atmosphères planétaires.** [Notes on the part possibly played by carbonic dusts in planetary atmospheres.] *Académie des Sciences, Paris, Comptes Rendus,* 248(14):2069–2070, April 6, **1959.** 10 refs. **DWB, DLC**—Carbonic dust and the molecule C_3 in the Martian atmosphere have been assumed for years as an explanation of the presence of a violet layer covering the entire surface of the planet. This hypothesis, supported by KOZYREV'S observations, is in accord with the theory of volcanic activity on the moon's surface. Admitting an analogous volcanic activity, the formation of C_3 and other products of hydrocarbons are also probable for Mars. The nature of the gas liberated from the interior, and forming the moon's atmosphere is, however, still unknown. The confirmation of the sphere observed by Kozyrev would support the escape of hydrocarbons. *Subject Headings:* **1. Martian atmosphere 2. Carbonic dusts in the atmosphere of Mars.**—*O.T.* Ⓢ

12J–188 523.43

†Sharonov, V. V., **Rezul'taty nabliudenii Marsa vo vremia velikogo protivostoianiia 1956 goda.** [Results of observations of Mars during the great opposition of 1956.] *Akademiia Nauk Tadzhikskoĭ SSR, Stalinabad, Institut. Astrofiziki, Biulleten,* No. 27:5–15, **1959.** 2 tables, 27 refs. **DLC**—In this thorough review of Martian studies in 1956 the author discusses the methods used and results obtained throughout the world during the planet's great opposition. The new techniques used included electronic photography, television devices, radioastronomy and photoelectric photometry. However, the most significant observations were not a result of advanced techniques used but rather of the unusual events taking place on the planet at the time, such as the appearance of large yellow clouds (attributed by most authors to dust particles) and the disappearance of the South Polar cap. Atmospheric pressure on Mars is now accepted as 85–90 mb, the temperature gradient as 3.7°C/km. Water vapor must be almost absent from the Martian atmosphere, but the formation of clouds (similar to the noctilucent clouds observed on Earth is possible even with such a minute concentration; and such clouds have been observed on Mars. Several theories have been advanced concerning the violet scattering layer; the author believes that in order to explain this effect it is not necessary to assume the existence of some high-altitude layer or unusual absorption, but that all phenomena observed on Mars can be fully accounted for by known processes of scattering by small and large atmospheric particles. *Subject Headings:* **1. Martian atmosphere 2. Martian opposition, 1956.**—*Transl. of author's abstract.* Ⓢ

12J–189 523.43:535.33

Sinton, William M. (*Lowell Obs., Flagstaff*), **Further evidence of vegetation on Mars.** *Science,* Wash., D. C., 130(3384):1234–1237, Nov. 6, **1959.** fig., table, 8 refs. **DLC**—During the 1958 opposition, improved equipment indicated the presence of large organic molecules by infrared-spectroscopic tests. Spectra were obtained on 13 mornings from Oct. 7 to 21 and during the first half of the night of the 21st. Thirty-two spectra were obtained of various regions of Mars with 1-mm apertures. Five spectra were obtained with 1-mm slits that traversed the region of Syrtis Major. No new absorptions other than the organic bands were found on Mars. The observed spectrum fits very losely, that of organic compounds and particularly that of planets. It is tempting to assume that the dark region also contains organic molecules. The strength of the band at 3.67μ compared to its weakness or absence in plants may indicate a significant difference in plants that may be present on Mars. (*Same item as* 11.9–88, *Met. Abs.*) *Subject Headings:* **1. Martian vegetation 2. Infrared spectroscopy 3. Spectroscopic observations of Mars 4. Martian opposition, 1958.**—*E.K.*

12–190 523.43:535.61

Teifel', V. G., **Pokazatel' tsveta Marsa v epokhu protivostoianiia 1958 g.** [Color index of Mars during the 1958 opposition.] *Astronomicheskiĭ Tsirkuliar,* Moscow, No. 202:1, June 5, **1959** and No. 204:10–11, Sept. 15, **1959.** 2 tables. **DLC**—Spectrophotometric observations of Mars made with a telescope (AZT-7) and with a spectrograph (ASP-g) in comparison with spectrum of the star (α Aur) at the same zenith distances are briefly described with tabulated data. The table contains the data, computed with given formula, for color index ($Cl\sigma$), phase angle (α), latitude of central meridian

of Mars (*L*) and number of measured spectrograms (*n*). *Subject Headings:* **1. Martian spect 2. Spectral brightness of Mars.**—*N.P.S.* Ⓢ

12J–191 523.43:57

Tikhov, G. A., **Est' li zhizn' na drugikh planetakh?** [Is there life on other planets?] 2n enlarged edition. Moscow, Moskovskiĭ Rabochiĭ, **1959.** 70 p. numerous figs. (some colo **DLC** (QB54.T5)—In this booklet written for wide distribution among both adolescent and ad readers on all levels of education the author describes the studies of Mars conducted under direction at the Astrobotany Section of the Academy of Sciences of the Kazakh SSR, and especia the observations made during the opposition in 1956. Physical conditions on the planet are discuss in connection with their suitability for biological development. A chapter on foreign reaction the work of the Astrobotany Section is included. The illustrative material includes two co drawings (combining numerous observations) showing the surface of Mars in spring and summer it appeared during the 1956 opposition. *Subject Headings:* **1. Life on Mars 2. Martian oppositi 1956.**—*G.T.* Ⓢ

12J–192 523

Tombaugh, Clyde W. (*New Mexico College of Agri. & Mechanic Arts, State College, N. M* **Mars-world for exploration.** *Astronautics*, N. Y., 4(1):30–31, 86–93, Jan. **1959.** figs., port (a vita). **DLC**—There is a long history behind the observation of the planet Mars. Nearly a cent and a half ago, HERSCHEL observed the seasonal changes in the white polar caps of Mars. In 18 SCHIAPARELLI discovered a network of long dark lines which he regarded as canals. An Ameri scientist, LOWELL, claimed in 1894 that Mars is inhabited by a race of intelligent beings. distance of Mars from the Sun, varies from 128 million miles at perihelion to 154 million at aphel The diurnal range of temperature is about 200°F over most of Mars. The distribution of the ma and desert regions of Mars is described. *Subject Heading:* **1. Mars.**—*A.H.K.* Ⓢ

12J–193 52

Wanders, A. J. M. (*Venlo, Helbeeck, Netherlands*), **The physical conditions on the planet M** *International Astronautical Congress, 9th, Amsterdam, Aug.* 1958, *Proceedings*, Vol. 1:394–404, iss **1959.** 4 figs. (incl. photos), 11 refs. English, German and French summaries. **DLC** (TL787.I44 A survey is given of our present knowledge about the planet Mars as revealed by visual and as physical observations. The various points discussed are the constitution of the atmosphere some of its implications, the nature and behavior of the snow caps at the poles, the bright de regions and the dark markings that occur mainly on the southern hemisphere, some of which an variable extent. Attempts that have been made to interpret the latter, among which the hypoth of vegetation is the most intriguing, are also discussed. (*Same item as* 11.9–89, *Met. Abs.*) *Su Heading:* **1. Martian atmosphere.**—*Author's abstract.*

1960

12J–194 523.43:551.510.4:53

Barabashov, N. P., **Ob atmosfere i poverkhnosti Marsa.** [On the atmosphere and surfac Mars.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 2:3–23, **1960.** 4 17 tables, 7 refs. **DLC**—Data on the Martian disk obtained in 1939, 1954 and 1956 by mean photographic photometry are analyzed. Values of the optical parameters of the atmosphere of M are computed. These parameters indicate that the Martian atmosphere possesses diffusive p erties and has a small optical thickness. *Subject Headings:* **1. Martian atmosphere 2. Ma surface features 3. Photometric observation of Mars.**—*Transl. of author's abstract.* Ⓢ

12J–195 523.43:53

Barabashov, N. P.; Koval', I. K. and Chekirda, A. T., **Nekotorye rezul'taty fotometrii obl nykh obrazovanii na Marse.** [Some results of the photometry of cloud formations on M *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 2:36–40, **1960.** 10 figs., 2 ta 2 refs. **DLC**—Some results of photometric measurements of "blue clouds" on Mars made in through ultraviolet and blue light filters are presented. It is found that the brightness con between clouds located near the intensity equator on the limb or terminator, and those in adja regions of the disk, has an average value of 14%. *Subject Headings:* **1. Photometric observatio Mars 2. Brightness of Mars 3. Blue haze on Mars 4. Martian clouds.**—*Transl. of au abstract.* Ⓢ

12J–196 5

Barabashov, N. P. and Koval', I. K., **Nekotorye rezul'taty issledovaniia kontrastov na M** [Results of studies of contrast on Mars.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(2):301

March/April **1960.** 4 figs., 6 eqs. Russian and English summaries p. 301. Transl. into English in *Soviet Astronomy AJ*, New York, 4(2):283–287, **1960. DLC**—An attempt at critical evaluation of the possibility of explaining contrast variations in terms of variations in the transparency of the Martian atmosphere is here based on a study of contrasts on Mars, in red, green, and blue light. The conclusion of the authors is that the observation data on contrasts on Mars in red, green, and blue light ($\lambda > 420\mu$) are primarily attributable to the energy distribution in the surface of the planet proper. *Subject Heading:* **1. Martian atmosphere.**—*Authors' abstract.* Ⓢ

12J–197 523.43

Barabashov, N. P. and Garazha, V. I., **Nekotorye soobrazheniia o pylevykh i tumannykh obrazovaniiakh na Marse.** [Some considerations on the dust and fog formations on Mars.] *Astronomicheskiĭ Zhurnal*, Moscow, 37(3):501–507, May/June **1960.** 9 figs., 5 tables, 3 refs. Russian and English summaries p. 501. **DLC**—On the basis of brightness distribution curves obtained during the opposition of 1956 and the indirect parts of indicatrices, some conclusions are made on the structure of the solid surface of Mars and properties of the yellow fog and mist, which often appear in the atmosphere of the planet. *Subject Headings:* **1. Martian atmosphere 2. Martian clouds.**—*Authors' abstract.* Ⓢ

12J–198 523.43:523.32

Barabashov, N. P. and Garazha, V. I., **O stroenii poverkhnostnykh sloev Luny i Marsa.** [Structure of the surface layers of the Moon and Mars.] *Khar'kov. Universitet. Astronomicheskaia Observatoriia, Tsirkuliar*, No. 21:5–18, **1960.** 15 figs., 9 tables, 9 refs. **DLC**—The problem of the structure of surface layers of the Moon and Mars is investigated. On the basis of results obtained through photometric analysis of artificial objects having different (geometrically regular) structure, and of terrestrial rock and volcanic material, it is found that the Moon's structure is most closely approximated by granulated tuff with grain diameters of 2–5 mm. Somewhat poorer agreement is found with volcanic ashes and slag. The Martian surface is best represented by red sand with grain diameters smaller than 0.1 mm and by various types of ocher with grain diameters of 0.05–0.07 mm. Surfaces covered with moss or similar vegetation do not resemble the surface of Mars. This agrees with earlier results obtained at Khar'kov Astronomical Observatory. *Subject Headings:* **1. Martian surface composition 2. Lunar surface.**—*Transl. of authors' abstract.* Ⓢ

12J–199 523.43

†de Vaucouleurs, Gérard (*Harvard College Obs., Camb., Mass.*), **The physical environment on Mars.** *International Symposium on the Physics and Medicine of the Atmosphere and Space, San Antonio, Texas, Nov.* 1958, *Proceedings of the 2nd Symposium.* Pub. N. Y., John Wiley, **1960.** p. 584–605. 7 figs., 3 tables, 46 refs., 5 eqs. **DLC, DWB** (M86:612 I612ph)—A summary of basic information on the physical environment on Mars is presented. The astronomical data given includes tables itemizing some elements of the orbits of Mars and some elements of the globe of Mars. Atmospheric attributes such as pressure and density, composition, structure, clouds, winds and ultraviolet radiation, and also surface temperatures, the polar caps and water as well as the surface features of Mars are discussed. Uncertainties are emphasized. These uncertainties will call for caution and general allowance for possible errors when applying such data to estimates of safety factors in technological applications, especially when manned operations are considered. *Subject Heading:* **1. Martian environment.**—*E.Z.S.* Ⓢ

12J–200 523.43:778.38

Dluzhnevskaia, O. B., **Kontrasty "more-materik" i "kaima-shapka" na Marse v 1956 i 1958 gg.** [Contrasts between maria and continents and between edge and cap on Mars in 1956 and 1958.] *Vsesoiuznoe Astronomo-Geodezicheskoe Obshchestvo, Biulleten'*, No. 27(34):10–14, **1960.** 11 figs., 4 refs. **DLC**—Photographs of Mars obtained during the opposition of 1956 with a camera specially constructed for the purpose, using various filters, were analyzed as to time variations of brightness contrasts in different parts of the planet. The purpose of the study was to investigate the source of the considerable turbidity which occurred on Mars at that time. Results of the analysis are shown in graphs. They appear to confirm the theory that the observed turbidity phenomena were due to dust storms. Observations made in 1958 are also reported; they show turbidity values of the same magnitude as those of 1956. Sample photographs are included. *Subject Headings:* **1. Brightness of Mars 2. Photographic observations of Mars 3. Martian opposition 1956 4. Martian opposition 1958.**—*G.T.* Ⓢ

12J–201 523.43:551.510.41:546.17:546.21

†Kiess, C. C.; Karrer, S. and Kiess, H. K. (*both, Georgetown College Obs.*), **A new interpretation of Martian phenomena.** *Astronomical Society of the Pacific, San Francisco, Publications*, 72(427):

256–267, Aug. **1960.** 30 refs. **DLC.** Review in: *Umschau*, Frankfurt a.M., 61(13):395, July **1961.** 6 refs.—This study challenges the usual explanations given in terrestrial terms of the featur of Mars. It is claimed instead that all of the available spectroscopic features of the Martian atmo phere can be accounted for by assuming the presence in it of oxides of nitrogen. In this conte just the properties of the oxides of nitrogen at low temperatures and pressures are discussed and th their relation to Martian phenomena is explained. *Subject Headings:* **1. Martian atmosphe composition 2. Nitrogen oxides on Mars.**—*I.S.* Ⓢ

12J–202 523.43:551.510.41:546.17:546.

Kiess, C. C.; Corliss, C. H. and Kiess, Harriet K. (*all, National Geographic Society and Natio Bureau of Standards*), **Evidence for oxides of nitrogen in the atmosphere of Mars.** *Science*, Was D. C., 131(3409):1319, April 29, **1960. DLC** (Q1.S35)—A short note reporting observatio evidence for the existence of nitrogen oxides in the Martian atmosphere. *Subject Headings:* **1. Ma tian atmospheric composition 2. Nitrogen oxides on Mars.**—*A.J.M.* Ⓢ

12J–203 523.43:778

†Lebedeva, I. I., **Izmerenie diametra i szhatiia Marsa po snimkam, poluchennym v 1956 go** [Measurement of the diameter and oblateness of Mars from photographs taken in 1956.] *Akadem Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 2:41–45, **1960.** 3 tables, 15 refs. **DLC** From Martian photographs made through yellow and red filters, lengths of the equatorial (a) a polar (b) diameters were determined by means of micrometry. Results of the measurements tabulated and values of oblateness ($\Sigma = (a-b)/a$) are derived as 0.0084 for the photographs throu yellow and 0.0072 for those through red filters. The photographs were made in 1956 under favora conditions as the polar cap was covered by a dense yellow cloud and thus one of the main sou of error, the difference in brightness at the ends of the two diameters, was eliminated. *Sub Headings:* **1. Martian diameters 2. Photographic observations of Mars 3. Oblateness of Ma** —*G.T.* Ⓢ

12J–204 523.43:778

Leroy, J. L. and Dollfus, A., **L'observation de la planète Mars en 1958.** [The observation of planet Mars in 1958.] *L'Astronomie*, Paris, 74(7):336–341, July/Aug. **1960.** 7 figs. **DLC, NI DWB**—The opposition of Mars in 1958 has been observed in different countries at a certain numbe official and private observatories and a large number of interesting observations were gathe The authors analyze the reproductions of drawings, photographs and records made on this occas More particularly a figure reproduces the planisphere of the planet Mars as obtained by the astr mer J. H. Focas by means of a 60 cm telescope at the Pic du Midi observatory with a magnifica of about 1000. *Subject Headings:* **1. Martian observations 2. Photographic observations of M 3. Martian opposition 1958 4. Pic du Midi, France.**—*A.V.* Ⓢ

12J–205 523.43:551.5

†Öpik, E. J. (*Dept. Physics, Univ. Maryland*), **The atmosphere and haze of Mars.** *Journa Geophysical Research*, Wash., D. C., 65(10):3057–3063, Oct. **1960.** 4 tables, 21 refs., 16 eqs. **DL** The 'blue haze' is an absorbing smoke dark as soot in reflection, red in transmission. Its curre accepted explanation by pure scattering (omnidirectional or forward) is untenable, as it w either increase the surface brightness or fail to obscure the surface details. The limb darke of Mars is mainly the result of absorption by the smoke. The opacity of the Martian atmosp increases from the red toward the violet. The extinction by the Martian atmosphere is gre than that by the terrestrial at all wavelengths, but only about 20 per cent of the Martian extinc is due to scattering. Dollfus' polarimetric estimate, corrected for self-absorption, corresponds Martian atmospheric pressure of 87 mm Hg. The photochemical breakup of carbon dioxide an escape of oxygen must lead to considerable concentrations of carbon monoxide in the Ma atmosphere. *Subject Headings:* **1. Martian atmosphere 2. Blue haze on Mars.**—*Author's abstra*

12J–206 .52

Sadil, Josef, **Výsledky pozorování Marsu v opozici 1958–59 v Československu.** [Resu observations of Mars in Czechoslovakia during the 1958–59 opposition.] *Říse Hvězd*, Pr 41(5):86–91, **1960.** 3 figs., refs. French summary p. 90–91. **DLC**—Visual observations of M by seven observers at the Prague Astronomical Observatory, and by several amateur astronome Czechoslovakia are reported. Eighteen drawings of the Martian disk as seen at different time presented and a composite chart of cloudiness observations is drawn. Changes in the visibili surface features and in cloudiness appear to indicate weather processes but the nature of the l cannot be ascertained. It is found that amateur observations can still make valuable contribu to the study of Mars, especially if conducted systematically. *Subject Headings:* **1. Martian obs**

ions 2. Martian opposition 1958 3. Amateur astronomical observations 4. Czechoslovakia. —*G.T.* Ⓢ

12J–207 523.43

Schmidt, Ingeborg (*Div. Optometry, Indiana Univ.*), **Visual problems in observing the planet Mars.** *Lunar and Planetary Exploration Colloquium, Proceedings*, 1 (6) :19–22, April 25, 1959 (re-issued as bound vol., **1960**). 3 figs. **DWB, DLC**—The knowledge of the size and the luminance of the observed areas is of primary importance for a useful application of the laws of visual physiology. The actual adaptation level would correspond to a somewhat lower level than the average luminance due to the smallness of the Martian disk. The speed of perception is highest on a light-adapted eye. Concerning brightness contrast, an illuminated surrounding is the best for observing the planet. The application of intermittent light is suggested to improve simultaneous brightness contrast. The so-called surface colors of Mars depend on the spectral distribution of the incident radiation. Color contrasts can be perceived on entirely achromatic areas when illuminated by a chromatic light source. Experiments demonstrate the possibility of the induction of color contrasts on Mars. It is safer to assume some apparently green areas due to contrasts, others being actually green. Plus or minus senses are suggested to minimize chromatic observation effects. The largest factor affecting visual activity is illumination. Some of the visual phenomena are illustrated by diagrams. *Subject Headings:* **1. Visual observations of Mars 2. Color of Mars.**—*O.T.* Ⓢ

12J–208 523.43

Schmidt, Ingeborg (*Indiana Univ., Bloomington*), **Sind die "grünen" Gebiete auf dem Mars wirklich grün?** [Are the "green" areas on Mars really green?] *Weltraumfahrt*, Frankfurt a.M., 1 (1) :9–11, March **1960**. 11 refs. **DLC**—The author emphasizes the practical uses of visual observation, which could be very helpful in interplanetary flights. There is a probability that the first planet visited by man will be Mars. The existence of "green areas" has been a controversial subject. In this paper a) the physiology of color vision, a significant factor in planetary observation, b) atmospheric effects in colonizing of the planets c) green areas on Mars and their dependence on stimulation contrast and d) possibilities to eliminate the contrast effects are discussed in a thoroughly readable form. *Subject Headings:* **1. Visual observations of Mars 2. Color of Mars.**—*E.K.* Ⓢ

12J–209 523.43 :535.243

Sharonov, V. V., **Nekotorye rezul'taty nabliudenii Marsa v protivostoianie 1958 goda.** [Some results of observations of Mars during the opposition of 1958.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 2 :24–29, **1960.** fig., 3 tables, 8 refs., 7 eqs. **DLC**—The various methods of determining optical characteristics of the atmosphere and surface of Mars are briefly reviewed. It is found that in interpreting the data obtained by means of spectrophotometry of Mars, there is no need for resorting to the hypothesis of large optical thickness of the planet's atmosphere, at least not in the visible range of the spectrum. *Subject Headings:* **1. Martian surface features 2. Spectrophotometric observations of Mars 3. Martian opposition 1958.**—*Transl. of author's abstract.* Ⓢ

12J–210 523.43 :535.24

Sharonov, V. V., **Fotometricheskie i kolorimetricheskie sravneniia poverkhnosti Marsa s obraztsami limonita i gornykh porod krasnotsvetykh tolshch.** [Photometric and colorimetric comparisons of the surface of Mars with samples of limonite and rocks of the red series.] *Akademiia Nauk SSSR. Komissiia po Fizike Planet, Izvestiia*, No. 2 :30–35, **1960.** 2 tables, 8 refs., 2 eqs. **DLC**—By means of a visual astrophotometer with a blue inlay the luminosity and yellowness factor of 300 samples were measured in order to identify rocks corresponding to the surface of Mars according to these criteria. A very close agreement was found between the Martian continents and ochreous forms of limonite. The hypothesis is advanced that the surface of the continents is completely covered with a uniform layer of loose ochreous dust. *Subject Headings:* **1. Martian surface composition 2. Photometric observations of Mars.**—*Transl. of author's abstract.* Ⓢ

12J–211 523.43

Sharonov, V. V., **O sushchestvovanii dlia Marsa savisimosti mezhdu tsvetom i fazoĭ.** [Existence of a correlation between color and phase for Mars.] *Astronomicheskiĭ Tsirkuliar*, Moscow, No. 208 :11, Jan. **30, 1960.** tables. **DLC**—The results obtained at 1956 by different investigators in changes of color index of Mars with time and its phase are contradicting. The photographic method indicates that the color of Mars is changing to a blue shade, however the photoelectric measurements are indicating a change to a red shade. The author's visual-colorimetric observations indicate no changes in the color. The author's method of observation with simultaneous comparison with the moon's color under the same conditions is described in detail and data are tabulated. *Subject Headings:* **1. Martian color changes 2. Color of Mars.**—*N.P.S.* Ⓢ

12J–212 551.521.9:523.43:621.396.8 523.43:535.3

Sinton, William M. (*Lowell Obs., Flagstaff, Ariz.*) and Strong, John (*Johns Hopkins Univ.*) **Radiometric observations of Mars.** *Astrophysical Journal*, Chicago, 131(2):459–469, March 196 7 figs., 3 tables, 7 refs., 4 eqs. **DWB, DLC**—Radiometric temperature measurements of Mars we made with the 200-inch reflector in 1954. The radiometry utilized filters that isolate bands radiation within the 8–13-μ "window." This broad-band radiometry was augmented with spect obtained with moderately good resolution with a grating spectrometer. The temperature of Ma at the center of the disk was found to be 15°C. Scans across the planet providing good signal-t noise ratios were made with an aperture as small as 1.5 seconds diameter. Several interesti phenomena were found and correlated with their appearance on photographs. The temperature a yellow cloud, which appears on photographs taken by others, was −25°C. Dark areas were a fe degrees warmer than adjacent bright regions. From several of the scans the diurnal temperatu variation was determined, and this has been compared with that derived from the theory of surfa heat conduction. It is found that no choice of the thermal constants will give agreement in bo phase lag and amplitude simultaneously. The reason appears to be the presence of the Marti atmosphere, which is ignored in the theory. The bands of carbon dioxide at 9.4, 10.4, and 12. have been found in the Martian spectrum. From the spectrum we may say that silicates are n present on the surface in large proportions. *Subject Headings:* **1. Radiometric observations of Ma 2. Grating spectrometers 3. Martian atmosphere.**—*Authors' abstract.* Ⓢ

12J–213 523.43:551.510

†Wilson, A. G., **The problem of the Martian blue haze.** *Lunar and Planetary Explorat Colloquium, Proceedings*, 1(4):33–37, Jan. 12, 1959 (re-issued as bound vol., 1960). 23 refs. **DW DLC**—The problem is approached by assuming that similarities with the earth's atmosphere per the application of terrestrial meteorological principles and that differences reveal the effects of extr polated conditions of phenomena. Reviewing the observational data some advanced explanati and some objections are presented. The dominant constituent of the Martian atmosphere is H_2O and CO_2 of the polar ice caps can also be expected in the atmosphere as the most likely cause the blue haze besides storms of meteoritic dust. But the rapid times of clearing and reforming of haze preclude all types of dust. The need for rapid, planet-wide temperature changes remain serious objective to the condensation hypotheses. The spectral study of the haze opens for consid tion as its cause several substances besides H_2O and CO_2. The earth might possess a haze laye that of Mars. Color changes, noctilucent clouds, etc. are discussed. *Subject Headings:* **1. Mart atmosphere 2. Blue haze on Mars.**—*O.T.* Ⓢ

1961

12J–214 52

Davidov, V. (*Astronomische Sternberg-Institut, Moscow*), **Ist der Mars mit Eis bedeckt?** Mars covered with ice?] *Weltraumfahrt*, Frankfurt a.M., 12(1):14–15, Feb. **1961. DWB, DL** In regard to the various theories which reject canals on Mars as contrary to evidence indicatin yearly temperature below the freezing point, A. I. LEBEDINSKII's suggestion of 1956 is discus concerning the existence of ice below its surface, the impossibility of the presence of water vapo its atmosphere notwithstanding. The author tried to determine the volume of water by compar with the processes responsible for Mars' and Earth's hydrosphere. A theory is developed on existence of ice oceans below the products of decaying rocks, and on the Mars-canals represen cleavages in these ice-oceans. *Subject Headings:* **1. Martian surface composition 2. Ice on M 3. Temperature of Mars 4. Martian canals.**—*O.T.* Ⓢ

12J–215 523.43:77

†Sharonov, V. V., **Litologicheskaia interpretatsiia fotometricheskikh i kolorimetriches issledovanii planety Mars.** [A lithological interpretation of the photometric and colorim studies of Mars.] *Astronomicheskiĭ Zhurnal*, Moscow, 38(2):267–272, March/April **1961.** 13 refs., eq. Russian and English summaries p. 267. Transl. into English in the correspon issue of *Soviet Astronomy AJ*, New York. **DLC**—The results of photometric and colorim observations of the surface of Mars, made during 1956 and 1958, are compared with data o analogical study of a large number of samples of earth rocks. It is found that, according to mean value of the albedo r and the color excess D, sand and other layers of deserts on the e the red colored rocks of the Permian formation and the dense varieties of limonite are not si to the continents of Mars, as the red color of the latter is more saturated. Only ochre, i.e. a va of limonite, is approximately similar to the color of the disk of Mars. Therefore a hypothes proposed that Mars is covered by dust or silt, consisting of small particles of limonite. The l when convected in the atmosphere, produce the orange haze, the development of which was chara

istic of the opposition of 1956. *Subject Headings:* **1. Color of Mars 2. Photographic observations of Mars 3. Martian surface composition.**—*Author's abstract.* Ⓢ

12J–216 523.43:551.510.41:546.17:546.21

Sinton, William M. (*Lowell Obs., Flagstaff, Arizona*), **An upper limit to the concentration of NO_2 and N_2O_4 in the Martian atmosphere.** *Astronomical Society of the Pacific, San Francisco, Publications,* 73(431):125–128, April **1961.** table, 8 refs. **DLC**—Kiess et al. have proposed an explanation of Martian phenomena based on processes involving the presence of observable oxides of nitrogen in the Martian atmosphere (*see* 12J–201, this bibliog.). The author uses an absorption table for different wave lengths in comparison with observed Martian spectra to show that the proposed theory is untenable. *Subject Headings:* **1. Martian atmospheric composition 2. Nitrogen oxides on Mars.**—*A.J.M.* Ⓢ

SUPPLEMENTARY MATERIAL

12J–217 523.43

Koval', I. K., **Rezul'taty fotograficheskikh nabliudenii Marsa v 1954 g. na Khar'kovskoĭ astronomicheskoĭ observatorii.** [Results of photographic observations of Mars at the Kharkov Astronomical Observatory during 1954.] *Astronomicheskiĭ Zhurnal,* Moscow, 34(3):412–418, May/June **1957.** fig., 9 tables, 9 refs. eqs. Transl. into English in *Soviet Astronomy AJ,* New York, 1(3):404–410, May/June **1957. DLC**—On the basis of results of observations of Mars, made in four spectral regions on the 20 cm refractor of the Kharkov Astronomical Observatory from June 1 to Sept. 10, 1954, the author comes to the following conclusions: 1) For the reduction of observations of Mars the formula of V. V. Sobolev and the formulae of V. G. Fesenkov and E. Schönberg may be used with equal success. 2) The slope of the brightness distribution curves in the spectral region 560–660 mμ decreases with increasing meridian altitude of the Sun. 3) Near the date of opposition, the color of the "maria" differs little from the color of the "continent." The "maria" at low southern latitudes change their color with variation of the meridian altitude of the Sun. 4) The reflection of light from the surface of "maria" of Mars does not follow Lambert's law. 5) The atmosphere above the Martian "maria" is more transparent than that over the "continent." 6) The south polar cap is reddish in comparison to a white screen. *Subject Headings:* **1. Martian observations 2. Kharkov, U.S.S.R.**—*Author's abstract.*

12J–218 523.43:523.035.3

Sharonov, V. V., **K voprosu o roli istinnogo pogloshcheniia v atmosfere Marsa.** [On the role of true absorption in the Martian atmosphere.] *Astronomicheskiĭ Zhurnal,* Moscow, 34(4):557–567, July/Aug. **1957.** 26 refs., 19 eqs. Transl. into English in *Soviet Astronomy AJ,* New York, 1(4):547–555, July/Aug. **1957. DLC**—It is shown that if in the Martian atmosphere there exists a "violet layer" consisting of particles which preferentially absorb, but do not scatter, rays corresponding to the violet end of the spectrum, then condensations in this layer should appear as dark, rather than light, spots on violet-sensitive photographs. There are no facts at the present time which cannot be explained by ascribing purely scattering properties to the Martian atmosphere, the more so since it is difficult to point to any gas or aerosol which could cause absorption with the necessary variation along the spectrum. *Subject Headings:* **1. Martian atmospheric absorption 2. Scattering of light in Martian atmosphere.**—*Author's abstract.*

12J–219 523.035.336:523.43

Moroz, V. I. and Kharitonov, A. V., **Fotoelektricheskaia fotometriia uchastkov poverkhnosti Marsa.** [Photoelectric photometry of sections of the surface of Mars.] *Astronomicheskiĭ Zhurnal,* Moscow, 34(6):903–920, Nov./Dec. **1957.** 7 figs., 8 tables, 21 refs:, 4 eqs. Transl. into English in *Soviet Astronomy AJ,* New York,1(6):874–890, Nov./Dec. **1957. DLC**—In 1956, during the favorable opposition of Mars, measurements of the brightness of regions of the planet's surface were made with an electrophotometer and reflector, $f=11.26$ m, $d=50$ cm. As a result the international photovisual and photographic magnitudes of the brightness (the brightness of 1 sec², expressed in stellar magnitudes) and the color indices of different points of the planet's surface were derived. The stellar magnitude of the brightness of each measured point was used for determining the albedo. The data are given in the form of tables and maps. The contrast between the maria and continents is comparatively small. For $\lambda_e=5450$ A it does not as a rule exceed $0^m.1$, and usually equals only several hundredths. The contrast in blue light is less, but on the whole the color index of the maria differs little from that of the continents (the maria are a little "bluer"). Evidently the contrast between dark and light regions varies strongly with time, in particular from one opposition to another, in dependence on different factors. Of the regions measured, of special interest is that of the bright

cloud which appeared at the end of Aug. The contrast between the cloud and the "undisturbed" surface was $0^m.07$ in photovisual and $0^m.01$ in photographic light. For one of the nights the radiometric luminous intensity from 1 sec^2 of the planet's surface in three wavelengths was calculated. *Subject Headings:* **1. Brightness of Mars 2. Color of Mars 3. Photoelectric photometry of Mars** —*From authors' abstract.*

12J–220 523.035.336:523.4

Gurtovenko, E. A. and Gordeladze, Sh. G., **Trekhtsvetnaia kolorimetriia integral'noĭ iarkosti Marsa po nabliudeniiam 1956 g.** [Three-color colorimetry of the integral brightness of Mars based on 1956 observations.] *Astronomicheskiĭ Zhurnal*, Moscow, 3(6):959–961, Nov./Dec. **1957**. 2 figs., table. Transl. into English in *Soviet Astronomy AJ*, New York, 1(6):926–928, Nov./Dec. **1957. DLC**—The integral brightness of Mars in three different colors (λ_{eff} =430, 546 and 622 mμ) was studied from observations made from Sept. 1, 1956–Jan. 2, 1957. Vega was used as a standard. The white stars of the Pleiades, which were photographed on the same negatives as the planet, were used for the calibration curves. The results of the measurements are given in a table. The great brightness of the planet during opposition, the sharp decrease in brightness with increasing phase and the considerable decrease of the color index of Mars during the period of observations should be specially noted. *Subject Headings:* **1. Colorimetry of Mars 2. Brightness of Mars 3. Color of Mars.**—*Authors' abstract.*

12J–221 523.4

Barabashov, N. P. and Koval', I. K., **K voprosu o stroenii Iuzhnoĭ poliarnoĭ shapki Marsa v 1956 g.** [Contribution to the study of the structure of the south polar ice cap of Mars during 1956.] *Astronomicheskiĭ Zhurnal*, Moscow, 35(2):261–264, March/April, **1958**. 5 figs., 9 refs., 4 eq. English summary p. 261. Transl. into English in *Soviet Astronomy AJ*, New York, 2(2):234–23 March/April **1958. DLC**—On the basis of the data of observations of Mars in 1956, made in visu light at various observatories of the world, and also observations in the ultraviolet made at th Kharkov Astronomical Observatory, one of the possible interpretations of the structure of the i caps of Mars is considered. The simultaneous disappearance of the southern polar cap aroun Sept. 1, 1956 in red and ultraviolet light makes probable the assumption that at that time the ca lay wholly on the solid surface of the planet (according to Wright, 1924). The contrast in brightne between the cap and the rest of the planet's surface observed in various parts of the spectrum explained by the absorbing (besides scattering) properties of the Martian atmosphere. An a proximate estimation of the optical density of the planet's atmosphere in the ultraviolet ($\tau \approx 0.$ has been made. *Subject Headings:* **1. Martian polar caps 2. Kharkov, U.S.S.R.**—*Author's abstra*

12J–222 523.42:535.2

Koval', I. K., **The absolute photometry of Venus in ultraviolet and infrared light.** *Sov Astronomy AJ*, New York, 2(5):739–743, Sept./Oct. **1958**. fig., 5 tables, 5 refs. Transl. of origin Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 35(5):792–796, Sept./Oct. **1958. DLC**—The pr cedure and results of photographic observations of Venus by the absolute photometric method a given. The observations were made with the 270 mm reflector of the Kharkov Astronomic Observatory, using ultraviolet and infrared color filters, in Aug. 1956. The results are given tables. *Subject Headings:* **1. Photometry of Venus 2. Venus photographs 3. Kharkov, U.S.S.R.** *Author's abstract.*

12J–223 523.

Barabashov, N. P., **Basic results of observations of Mars during the favorable opposition of 19** *Soviet Astronomy AJ*, New York, 2(6):814–824, Nov./Dec. **1958**. 4 figs., 3 tables, 12 refs. Tran of original Russian in *Astronomicheskiĭ Zhurnal*, Moscow, 35(6):869–880, Nov./Dec. **1958. DLC** The basic results are presented of the observations of Mars during the favorable opposition of 19 conducted in the U.S.S.R. at the Abastumani Astronomical Observatory, in the astrobotany secti of the Acad. Sci. Kazakh S.S.R., in the High-Altitude Astrophysical Observatory of the Astrophysi Institute of the Acad. Sci. Kazakh S.S.R., by the Astronomical-Geodetic Society, in the Ma Astronomical Observatory of the Acad. Sci. U.S.S.R., in the Kazan Astronomical Observatory, the Crimean Astrophysical Observatory, in the Tashkent Astronomical Observatory and in t Astronomical Observatory of the Kharkov State University. The results of photographic a visual observations are presented, as well as those of photoelectric and spectrophotometric obser tions. The questions are considered of the causes of the disappearance of the south polar cap Mars between Aug. 30th and Sept. 14th and of the appearance of strong yellow-orange formatio which for a long time hid various areas of the planet's surface. Furthermore, certain conclusio are drawn on the structure of the polar cap, continents and seas of Mars, and also on the absorbi

and dispersing properties of its atmosphere. *Subject Headings:* **1. Martian observations 2. Martian opposition 1956 3. U.S.S.R.**—*Author's abstract.*

12J–224 523.43:551.521.3

Kurchakov, A. V., **Ob opticheskikh svoĭstvakh atmosfery i poverkhnosti planety Mars.** [Optical properties of the atmosphere and surface of Mars.] *Leningrad. Universitet, Vestnik*, 15(7): 154–163, **1960.** 13 tables, 12 refs., 39 eqs. **DLC**—Contradictory interpretations of Martian observations have been advanced due to the fact that some authors assumed the Martian atmosphere to be essentially a scattering medium, while others considered it an absorbing medium. Attempting to end this controversy, SHARONOV (*see* 12J–218) evaluated the true absorption in the Martian atmosphere and found that brightness distribution over the Martian disk can be fully explained by the scattering properties of the Martian atmosphere. SHARONOV, however, considered only primary scattering which made his findings inconclusive. The author of the present article undertakes to study the optical properties of the atmosphere of Mars, considering higher-order scattering. On the basis of Ambartsumian's theory he derives the relationships of the four optical parameters optical thickness, index of scattering, coefficient of scattering and coefficient of absorption. By comparing these relationships with observed brightness distribution on Mars at several wave lengths, he calculates actual values of the above parameters. The conclusion is reached that Mars has essentially a scattering atmosphere and true absorption in it appears to be insignificant. *Subject Headings:* **1. Martian atmospheric absorption 2. Scattering of light in Martian atmosphere.**—*G.T.* Ⓢ

12J–225 523.42:551.510

Jones, Sir Harold Spencer, **The planet Venus and its atmosphere.** *Royal Institution of Great Britain, London, Proceedings*, 37(3):241–255, **1959.** 2 figs. **DLC**—A lecture summarizing some of the inferences on the nature of the atmosphere of Venus and some of the unsolved problems relating to the formulation of additional inferences. Because Venus most closely resembles the Earth in size, mass and mean density, and its escape velocity is 6.5 m/sec it is expected that Venus is surrounded by an atmosphere probably less extensive than that of the Earth. Venus is a yellow planet, Earth is blue, and it is believed that their atmospheres might therefore be of a different nature. Proof that Venus has an atmosphere is obtained in several ways which are briefly explained. Studies of the spectrum of Venus indicate the presence of carbon dioxide. The work of ADAMS and DUNHAM and that of HERZBERG and KUIPER are noted. The amount of oxygen in the atmosphere of Venus is less than the equivalent of one meter of oxygen at standard temperature and pressure and consequently is certainly less than 1000th of that in the Earth's atmosphere. Water vapor has not been detected and it is concluded that any water present is equivalent to less than 1 mm of precipitable water vapor. It is estimated that the surface temperature of Venus may be higher than 100°C. The work of the French astronomer LYOT on the polarization of the integrated light from Venus is described. He concludes that the planet must be covered with clouds of a fairly permanent character and the depth of the atmosphere must be at least several km. Since the light scattered by Venus is yellowish the light scatterers could not be water vapor but are probably dust. GROTH and HARTECK's suggestions on the composition of the clouds are presented. It is concluded that Venus is an arid world with an extensive atmosphere and that, because of the high temperature at its surface, this atmosphere is subject to a general circulation which is very much more vigorous than the Earth's. Winds blowing across Venus swirl dust from its surface up to great heights and form clouds which screen the planet's surface from us. The lack of oxygen on Venus may be evidence that there has been no extensive development of plant life there. *Subject Heading:* **1. Venus atmosphere.**—*E.Z.S.* Ⓢ

12J–226 523.42(02)

†Moore, Patrick, **The planet Venus.** London, Faber and Faber, [1956]. 132 p. 13 figs., 155 refs. **DLC** (QB621.M6). 2nd ed. rev and enl. London, Faber and Faber, **1959.** [2nd ed. UNCHECKED.]—This is the first book devoted entirely to the planet Venus. Omitting technical detail, the author deals in a lucid manner with the history of research, the present status of knowledge and the matters still open for exploration, concerning the planet as a whole, its movements, dark and bright areas, polar caps, canals, atmosphere, ashen light, transits, occultations, surface conditions, suitability for life, etc. *Subject Heading:* **1. Venus.**—*G.T.*

12J–227 523.4

Moore, Patrick, **Mercury, Venus and Mars.** *Discovery*, London, 21(1):18–23, Jan. **1960.** 5 figs. **DLC**—Physical conditions on Mercury, Venus and Mars are discussed. Such features as surface color and markings, atmospheric composition, possibility of life, satellites, general orbital data and a few methods of investigation (radio, observation of occultations) are covered. *Subject Headings:* **1. Mercury 2. Mars 3. Venus.**—*A.J.M.* Ⓢ

12J–228 523.42:551.511:523.036.5

King, Jean I. F., **The dynamic stability of the upper atmosphere of Venus.** *Symposium o Ballistic Missile and Space Technology, 5th, Los Angeles, Aug. 1960, Proceedings.* N. Y., Academi Press, **1960.** Vol. 3:445–450. table, 4 refs., 10 eqs. **DLC** (TL787.S9)—The far-infrared lim darkening curve measured by SINTON and STRONG is used to determine the thermal stability of th optically accessible Venus atmosphere. It is found that the atmosphere above the obscuring laye is convectively stable with a lapse-rate about half that of the Venus adiabatic lapse-rate. Th observed temperature decrease with height, together with the radiative heating pattern, show similarities to the upper terrestrial troposphere and, conversely, argues against the presence of a lov warm, ozone-generated stratosphere. These results, which are inferred from hard-won telescopi data, point up the need and usefulness of near-Venus radiation probe measurements. *Subje Headings:* **1. Venus's atmosphere 2. Temperature of Venus.**—*Author's abstract.* Ⓢ

12J–229 523.42:523.036.5

†Öpik, E. J. (*Dept. of Physics, Univ. of Md.*), **Aeolosphere and atmosphere of Venus.** *Journ of Geophysical Research*, Wash., D. C., 66(9):2807–2819, Sept. **1961.** fig., 4 tables, 28 refs., 30 eq **DLC**—A self-consistent model of the Venus atmosphere that satisfies the multitude of existin observational data is proposed. Its main properties and the line of reasoning are described a follows. The radiative greenhouse effect cannot account for a surface temperature of 570°K. Th blanketing must be due to dust, and the main source of energy, wind friction at the surface. Th term 'aeolosphere' is proposed for the region between the surface and the clouds of Venus, whe wind is responsible for grinding and raising the dust as well as for the heating. Self-consistency requir the opacity to be so high as to impose an adiabatic vertical lapse rate. The potential temperatu in the aeolosphere must be nearly constant. Horizontal pressure gradients driving the wind a caused by climatic differences near the top of the dust clouds. The dust may consist of calcium an magnesium carbonates with impurities. Pressure estimates from CO_2 bands and optical scatterin point to the presence of two distinct reflecting layers, the visible cloud level at about 0.6 atm a 340°K, and an upper haze level at 0.08 atm and 234°K. In the visual and near infrared the upp haze is virtually transparent, owing to forward scattering. In the ultraviolet, and in the infrar beyond 1.4 microns, it is opaque. Vertical cross sections of the Venus atmosphere are construct for 80, 40, and 20 per cent CO_2. For 80 per cent CO_2 the results are somewhat more consisten yielding a pressure of 4.3 atm at 570°K at the surface, 22 km below the visible cloud level. Desp uncertainties in the H_2O content, its amount is so small as to be nowhere condensable. *Subj Headings:* **1. Venus's atmosphere 2. Temperature of Venus.**—*Author's abstract.* Ⓢ

12J–230 523.42:551.5

Warner, B., **The clouds of Venus.** *British Astronomical Association, London, Journal,* 71(200–201, May **1961.** 9 refs. **DLC**—Up to 1959 the nature of the substance forming the Cythere clouds was still open to doubts but it is now accepted that the most probable substance is wa droplets. The existence of water vapor in the Cytherean atmosphere has been demonstrated photographs of the spectrum of Venus using a spectrograph carried to a height of 80,000 ft by ballo Accepting the view that it is just possible to see the solid planet through the cloud and that the clo thickness is of the order of $\frac{1}{2}$ km the author computes the total mass of condensed water in t Cytherean atmosphere to be of the order of 2×10^{15} grams. Assuming that very little of the to water in the atmosphere is in liquid form a value of 10^{18} to 10^{20} grams is suggested for the total wa vapor content. *Subject Headings:* **1. Water on Venus 2. Clouds on Venus.**—*R.B.* Ⓢ

12J–231 523.42:551.510.41:546.2

†Kaplan, Lewis D. (*Dept. of Met., M.I.T.*), **A new interpretation of the structure and C content of the Venus atmosphere.** *Planetary and Space Science,* N. Y., 8(1):23–29, Oct. 19 fig., table, 16 refs., 11 eqs. **DWB**—The observations of Venus in the near (KUIPER, CHAMBERL and KUIPER) and far (STRONG and SINTON) infrared are critically reviewed and interpreted in light of recent laboratory determinations of the absorption of CO_2. These, together with the termination of the scale height at about 70 km above the cloud surface by observing the occultat of Regulus (DE VAUCOULEURS and MENZEL), lead to a model of the Venus atmosphere and cl layer temperatures that are self-consistent. It is concluded that a cloud-top temperature of 235 a cloud-top pressure of about 90 mb, and a CO_2 concentration of 15 per cent by volume best fit observations. The amount of CO_2 above the cloud tops is then about 100 meters STP. effective reflecting level for near infrared radiation is lower in the atmosphere, with about 400 STP of CO_2 above it. These lower clouds cannot be composed of water (or ice) particles. *Sub Heading:* **1. Carbon dioxide in the atmosphere of Venus.**—*Author's abstract.* Ⓢ

12J–232 523.42:551.521.326

Kozyrev, N. A., **O svechenii nochnogo neba Venery.** [Night airglow on Venus.] *Akademiia Nauk SSSR. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia,* 12:169–176, **1954.** fig., 2 tables, 4 refs. **DLC**—Preliminary interpretation of the night airglow spectrum of Venus obtained in March 1953 at the Crimean Astrophys. Obs. by means of a quartz spectrograph is reported. The emission bands at 3914A and 4278A corresponding to N_2^+ molecules bore characteristics of terrestrial auroras. The absolute brightness of these bands was of the order of 10^{-2} erg/cm² sec. The Venus spectrum contained many other emission bands which could not be identified. Atomic lines were absent. The general brightness of the Venus night airglow exceeded by a factor of 50 that of the Earth and may be compared with $\frac{1}{3}$ of the illumination of the full Moon. *Subject Heading:* **1. Airglow of Venus.**—*S. Nowinska.*

12J–233 523.42:551.521.3:523.035.3

Kozyrev, N. A., **Molekuliarnoe pogloshchenie v fioletovoĭ chasti spektra Venery.** [Molecular absorption in the violet region of the spectrum of Venus.] *Akademiia Nauk SSSR. Krymskaia Astrofizicheskaia Observatoriia, Izvestiia,* 12:177–181, **1954.** 2 figs., 4 refs. **DLC**—Spectrograms of Venus obtained in 1953 at the Crimean Astrophys. Obs. permit good comparison with solar spectra in the range of 3800–6500A. The atmosphere of Venus scatters red light without perceptible absorption. At shorter wave lengths the absorption increases up to 0.5 m at 4540A and depends on solid or liquid yellow particles. Starting with 4540A the absorption rises steeply and at 3800A it increases by another 1.5 m. Here two edges of molecular bands appear, reddish in color: $\lambda_1 = 4372 \pm 3$A and $\lambda_2 = 4120 \pm 4$A. This proves that the violet absorption in the spectrum of Venus is of molecular origin. Interpretation is given of Venus disk pictures in ultraviolet and the assumption advanced that the multiatomic molecules revealed in the atmosphere of Venus play a dominant role, like water vapor on Earth. The atmosphere of Venus differs from that of the Earth by the absence of convection at the lower atmospheric levels. The atmosphere of Venus is considered stationary at the surface, with a 30°C temperature and receiving a crepuscular illumination. All weather phenomena occur in the upper layers. The bright night airglow of Venus may be due to atmospheric discharges (storms) in the upper atmospheric layers. *Subject Headings:* **1. Venus's atmosphere 2. Spectrographic observations of Venus 3. Venus's spectra.**—*S. Nowinska.*

12J–234 523.42:523.035.336

Martynov, D. Ia. and Pospergelis, M. M., **Zametka o fotometricheskom analize stroeniia atmosfery Venery.** [A note on the photometric analysis of the structure of the atmosphere of Venus.] *Astronomicheskiĭ Zhurnal,* Moscow, 38(3):558–561, May/June **1961.** fig., 2 tables, 3 refs. Russian and English summaries p. 558–559. Transl. into English in the corresponding issue of *Soviet Astronomy AJ,* New York. **DLC**—The light curve of Regulus during its occultation by Venus is analyzed. It is concluded that on the average the height of the homogeneous atmosphere H of Venus is 6 km. However at 30–50 km above the cloud layer of the planet, the value of H decreases considerably. This may be connected with large local drops in the temperature. *Subject Headings:* **1. Venus's atmosphere 2. Occultation of Regulus by Venus.**—*Author's abstract.* Ⓢ

12J–235 523.43:523.035.336

Gordeladze, Sh. G. and Gurtovenko, E. A., **Trekhtsvetnaia kolorimetriia integral'noĭ iarkosti Marsa v period protivostoianiia 1956 g.** [Three color colorimetry of the total brightness of Mars during the 1956 opposition.] *Akademiia Nauk Ukrainskoĭ RSR, Kiev. Holovna Astronomichna Observatoriia, Izvestiia,* 2(2):140–154, **1958.** 5 figs., 5 refs. **DLC** (QB1.A17652)—Photographic observations of Mars were carried out at the Main Astronomical Observatory, Acad. Sci., Ukrainian SSR, during its opposition from Sept. 1, 1956 to Jan. 2, 1957, in order to determine its total brightness, varying with phase, from measurements in three spectral regions. The brightness of the planet in opposition was found to be unusually high ($m_0 = -3.47$ m) and it dropped rapidly with increasing phase angle. Color indexes varied sharply with phase. These data indicate an unusual state of the Martian atmosphere during the 1956 opposition. *Subject Headings:* **1. Brightness of Mars 2. Colorimetry of Mars 3. Martian opposition, 1956.**—*S. Nowinska.*

12J–236 523.43

†Akademiia Nauk SSSR. Komissiia po Fizike Planet, **Rezul'taty nabliudenii Marsa vo vremia velikogo protivostoianiia 1956 g. v SSSR.** [Results of observations of Mars in the U.S.S.R. during the great opposition of 1956.] Moscow, Akademiia Nauk SSSR, **1959.** 194 p. figs., tables, numerous refs., eqs. **DLC** (QB516.A3)—During the 1956 opposition the Academy of Sciences of the U.S.S.R. organized an extensive program of Martian observations. Most of the participating observatories were in the southern part of the U.S.S.R. This collection of articles contains reports

on the results of the various projects, including tabulated data, etc. The contents of the collectio are as follows: Tikhov, G. A., **Kratkye rezul'taty nabliudenii Marsa v Sektore astrobotaniki v perio velikogo protivostoianiia 1956 g.** [Summary of results of observations of Mars during the grea opposition of 1956 in the Sector of Astrobotany], p. 6–9. The Martian spring was observed visuall and photographically through light filters, by spectrophotography and photometry. A rise temperature was noticed with a subsequent sand and dust storm covering the south polar cap with yellow-orange blanket. Barabashov, N. P. and Koval', I. K., **Fotograficheskaia fotometriia Mars so svetofil'trami** [Photographic photometry of Mars through light filters], p. 10–113 (incl. over pages of tables). Various optical properties of Mars during seasonal changes were investigate Data on the brightness of various regions on the disk, the visibility of features, clouds, fogs an precipitation, the variations of the shape of the south polar cap and its dark contour were compile and are presented in tables and charts. Sytinskaia, N. N., **O fotometricheskom issledovanii o ticheskikh svoĭstv atmosfery planety Mars** [Photometric investigation of optical properties of t atmosphere of the planet Mars], p. 114–123. The problem of studying the optical properties of specific planet is reduced to the determination of certain parameters: the optical thickness and t coefficient of vertical transparency; the scattering index and the absorption coefficient. The conditions are analyzed and the corresponding formulas derived for Mars. Sharonov, V. V., **Pove khnost' i atmosfera Marsa po fotograficheskim, fotometricheskim i kolorimetricheskim nabliu deniiam, vypolnennym v 1956 g. v Tashkente** [Surface and atmosphere of Mars according to photo graphic, photometric and colorimetric observations in 1956 at Tashkent], p. 123–155 (32 refs The program consisted of photography in five spectral bands, photometric observation, standar ization of negatives for absolute photometry and visual observation of Martian features. T disappearance of the southern polar cap was found to proceed normally with a dark contour arou the cap clearly visible. The melting of the polar cap was related to the appearance of a yellow f in Sept. 1956, assumed to be dust rising from the desert-type surface probably containing ferro oxide hydrates. Tables of integral colorimetry, computation of albedo and some conclusions on t Martian atmosphere by means of comparison with terrestrial data are presented. Sharonov, V. **Opyt opredeleniia kontrastov na diske Marsa metodami vizibilimetrii** [Attempt at determini contrasts on the Martian disk by visibility measurement], p. 155–165. Different methods for co paring the brightness of features on the planet's disk, as sea-continent contrast, are described and t effectiveness of various methods is compared in a table. A second table gives regular visual measu ments of sea contrasts in the central part of the disk. It is concluded that from Aug. 12–17 t contrast, and hence the transparency of the Martian atmosphere, was average, from Aug. 18 Sept. 12 it was above average, and from Sept. 13–25 a sharp deterioration occurred due to dust fo the observation of which was a peculiarity of the 1956 opposition. Sytinskaia, N. N., **Nekoto soobrazheniia o sostoianii atmosfery Marsa** [Some concepts concerning the state of the Mart atmosphere], p. 166–171. Formulas for computing the transparency of the Martian atmosph are derived and analyzed. The yellow fog of Sept. 1956 reduced the transparency coefficient b factor of 3. It is assumed that the yellow fog, since its duration seems too long for a fog, is rat an atmospheric layer of silt or pelite aerosols. The Martian surface is probably covered with oc powders. Bronshten, V. A., **Vizual'nye nabliudeniia Marsa vo vremia velikogo protivostoian 1956 g.** [Visual observations of Mars during the great opposition of 1956], p. 172–187 (inclu photos). In Aug.–Sept. 1956 visual and photographic observations were made at the Staling planetarium. The melting of the south polar cap is shown in a graph and tabulated. Some ra variations in the southern hemisphere were noticed as well as some anomalous phenomena appear as white spots in the Argyle I region and spreading over the whole hemisphere. Thereafter a above the polar cap expanded between Aug. 28 and Sept. 1 over the whole disk. 25 canals w spotted during the whole observation period and are tabulated. Bronshten, V. A. and Dluzhn skaia, O. B., **Fotograficheskaia fotometriia svetloĭ oblasti Argyre na Marse v kontse avgusta 195** [Photographic photometry of the bright region Argyre on Mars at the end of Aug. 1956], p. 188– A feature of 1956 was the appearance of bright spots in the regions of Argyre and Noachis. brightness variation was recorded photographically. The measured black densities on the negat were converted into relative brightness by means of characteristic curves obtained for each fi The ratio of the brightness of Argyre to that of the northern hemisphere was computed and is sh in graphs for each filter. The computation of the albedo of Argyre indicates that the region covered with a material similar to that of the polar cap. *Subject Headings:* **1. Martian opposit 1956 2. Martian observations 3. Photometric observations of Mars 4. U.S.S.R.**—*S. Nowinsk*

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Akademiia Nauk SSSR, **Atlas risunkov Marsa.** [Atlas of drawings of Mars.] Moscow, 1 117 p. 474 figs.—474 selected black-and-white drawings of the Martian surface during the opposition are presented. They were made by a number of observers at several locations in southern U.S.S.R. Different working methods were used. Data on the circumstances of obse tion are given for each drawing and the features observed are discussed in detail. *Subject Head* **1. Martian drawings 2. Martian opposition, 1956 3. U.S.S.R. I. Bronshten, V. A. (comp.).**

PART III. RECENT TRANSLATIONS AND ANALYTICS FROM SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological and Geoastrophysical Abstracts.**

A. TRANSLATIONS

Artificial Earth Satellites, pub. N. Y., Plenum Press, Vol. 1, 1960 (Transl. of the original Russian in **Iskusstvennye Sputniki Zemli,** Moscow, No. 1, 1958)

Vernov, S. N.; Grigorov, N. L.; Logachev, Iu. I. and Chudakov, A. E.: **Cosmic-ray measurements with artificial Earth satellites,** p. 5–9

Lidov, M. L.: **Determination of atmospheric density from the observed deceleration of the first artificial Earth satellites,** p. 10–24

El'iasberg, P. E.: **Determination of density of the upper atmosphere from secular variations of orbital elements of the first two artificial Earth satellites,** p. 25–29

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Shklovskiĭ, I. S.: **Optical methods for the observation of artificial Earth satellites,** p. 55–63

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Zhekulin, L. A.: **Distribution of electron density as a function of height from data of experiments with rockets and artificial Earth satellites: effect on propagation of radio waves,** p. 85–101

Chernov, V. N. and Iakovlev, V. I.: **Research on animal flight in an artificial Earth satellite,** p. 102–120

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Shvidkovskiĭ, E. G.: **Some results of measurements of thermodynamic parameters of the stratosphere obtained with the aid of meteorological rockets,** p. 12–19

Mirtov, B A.: **Disturbances occurring in the gaseous medium during the flight of a satellite,** p. 20–31

Mikhnevich, V. V.: **Preliminary results of a determination of the density of the atmosphere above 100 km,** p. 32–39

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Krasovskiĭ, V. I.: **Soviet ionospheric studies using rockets and artificial Earth satellites,** p. 45–62

Dolginov, S. Sh.; Zhuzgov, L. N. and Pushkov, N. V.: **Preliminary report on geomagnetic measurements carried out from the third Soviet artificial Earth satellite,** p. 63–67

Komissarov, O. D.; Nazarova, T. N. et al.: **Micrometeorite studies using rockets and satellites,** p. 68–74

Krasovskiĭ, V. I.; Kushnir, Iu. M. et al.: **Search for corpuscles with the help of the third artificial Earth satellite,** p. 75–77

Vernov, S. N.; Vakulov, P. V. et al.: **Study of the soft component of cosmic rays outside the Earth's atmosphere,** p. 78–89

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Isakovich, M. A. and Roi, N. A.: **Acoustical method for the measurement of the mechanical parameters of meteorites,** p. 105–107

Problems of the North, Ottawa, No. 2, 1958, transl. and issued June 1961. (Transl. of t original Russian in **Problemy Severa,** Moscow, No. 2, 1958. For original Russi see 10(9):1441, Sept. 1959, *Met. Abstracts*)

Drogaĭtsev, D. A.: **Wind currents in the Arctic Ocean,** p. 1–12
Fel'zenbaum, A. I.: **Theory of steady drift of ice and the calculation of the long period me drift in the central part of the Arctic Basin,** p. 13–44
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Soviet Astronomy AJ, New York, Vol. 4, No. 5, March/April 1961. (Transl. of origin Russian journal, **Astronomicheskiĭ Zhurnal,** Moscow, Vol. 37, No. 5, Sept./Oct. 196

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Panfilov, D. V.: **Location of the boundary between the tropical and subtropical landscapes in eastern Asia (based on material from a field study of Yunnan),** p. 24–37 (From *ANSSSR, Izvestiia, Ser. Geog.*, No. 3:31–41, 1959)

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Letunov, P. A.; Ivanova, E. N.; Rozov, N. N.; Fridland, V. M.; Shashko, D. I. and Shuvalov, S. A.: **Soils and bioclimatic regionalization of the USSR,** p. 32–55 (From Proceedings of 3rd Congress of the Geographical Society of the USSR)

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Bondarchuk, B. G.; Buchinskiĭ, I. E. et al.: **Natural resources of the Ukrainian SSR and ways of using them rationally,** p. 12–35 (From Proceedings of 3rd Congress of the Geographical Society of the USSR)

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Budyko, M. I.: **Heat balance of the Earth's surface,** p. 3–14 (From Proceedings of 3rd Cong of the Geographical Society of the USSR)

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Guseva, I. N.: **Climate maps in national atlases,** p. 49–55 (From *Moscow. Universitet, Vest Ser. Geografich.*, No. 6:26–32, 1960)

B. ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

Akademiia Nauk Kazakhskoĭ SSR. Sektor Astrobotaniki, Trudy, Vol. 1, 1953, issued Alma

Tikhov, G. A.: **Vozmozhna li zhizn' v drugikh mirakh (Astrobiologiia),** [Is life possible in worlds? (Astrobiology)], p. 3–17

Baĭda, Kh. S. and Suvorov, N. I.: **Obshchebiologicheskoe znachenie astrobotaniches issledovaniĭ,** [Role of astrobotanical investigations in general biology], p. 18–24

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Tikhomirov, V. S.: **Ob amplitude sezonnykh izmeneniĭ nekotorykh spektral'nykh o hatel'nykh svoĭstv rasteniĭ,** [Amplitude of seasonal changes of some spectral refle properties of plants], p. 37–41

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Bazhenov, M. A.: **Opredelenie temperatury Novoĭ Gerkulesa 1934 metodom Tsanstra,** termination of the temperature of Nova Herculis in 1934 by Zanstra's method], p.

Bazhenov, M. A.: **Spektrofotometricheskaia temperatura Novoĭ Gerkulesa 1934,** [Spectrophotometric temperature of Nova Herculis in 1934], p. 66–72

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Suvorov, N. I. and Parshina, Z. S.: **Spektrofotometricheskoe izuchenie polosy pogloshcheniia khlorofilla v sviazi s problemoĭ kosmicheskoĭ evoliutsii fotosinteza,** [Spectrophotometric study of the absorption line of chlorophyll in connection with the problem of cosmic evolution of photosynthesis], p. 33–47

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